

IN THE
Circuit Court of the United States
NINTH CIRCUIT,
NORTHERN DISTRICT OF CALIFORNIA.

THE SPRING VALLEY WATER WORKS (a corporation),

Complainant,

vs.

THE CITY AND COUNTY OF SAN FRANCISCO
(a municipal corporation), THE BOARD OF SUPERVISORS OF THE CITY AND COUNTY OF SAN FRANCISCO, and James P. Booth et al., members of and constituting said Board of Supervisors,

Defendants.

No.
13,395
IN
EQUITY

THE SPRING VALLEY WATER COMPANY (a corporation),

Complainant,

vs.

THE CITY AND COUNTY OF SAN FRANCISCO
(a municipal corporation), THE BOARD OF SUPERVISORS OF THE CITY AND COUNTY OF SAN FRANCISCO, and James P. Booth et al., members of and constituting said Board of Supervisors,

Defendants.

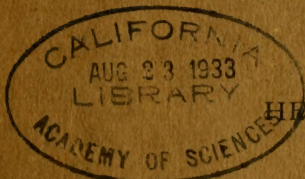
Nos. 13,598
and 13,756
IN EQUITY

**COMPLAINANT'S OPENING BRIEF
AND ARGUMENT.**

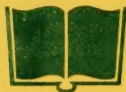
A. E. SHAW.

HELLER, POWERS & EHRMAN,

Solicitors for Complainant.



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THE CITY AND COUNTY OF SAN FRANCISCO
(a municipal corporation), THE BOARD OF SUPERVISORS OF THE CITY AND COUNTY OF SAN FRANCISCO, and James P. Booth et al., members of and constituting said Board of Supervisors,

Defendants.

No.
13,598
IN
EQUITY

THE SPRING VALLEY WATER COMPANY (a corporation),

Complainant,

vs.

THE CITY AND COUNTY OF SAN FRANCISCO
(a municipal corporation), THE BOARD OF SUPERVISORS OF THE CITY AND COUNTY OF SAN FRANCISCO, and James P. Booth et al., members of and constituting said Board of Supervisors,

Defendants.

No.
13,756
IN
EQUITY

COMPLAINANT'S OPENING BRIEF
FOR CASES NO. 13395 (1903), NO. 13598 (1904), AND
NO. 13756 (1905).

I. STATEMENT OF STATUS OF CASES
AND STIPULATIONS.

The cases under consideration are to determine whether or not the rates fixed by the Board of Supervisors of San Francisco for water to be furnished by complainant are unreasonable and unjust and thereby take property from complainant without just compensation.

Case No. 13,756 refers to the ordinance passed for the year 1905-6. It was stipulated in the latter case that the answer in the 1903 case should be deemed the answer in case No. 13,756, and that all allegations in the complaint in that case should be deemed denied, and it is alleged in this latter case that the revenue collected for the year 1904-5 under the ordinance fixed in 1902 was 3.78 per cent. on the par value of complainant's capital stock. The ordinance for 1905-6 which is the subject of investigation in case No. 13,756 is identical with the ordinance of 1904-5.

It was subsequently stipulated in open Court that Case No. 13,756 (1905) should be submitted on the same general evidence as the other two cases, with such additional testimony as should be necessary to bring the evidence down to the end of the fiscal year involved—to-wit, to July 1st, 1906. This stipulation has since been reduced to writing, signed by the respective solicitors,

and is now on file in the last-mentioned case. All three cases have practically the same complainant and defendants.

Subsequent to the commencement of the suit in 1903, the Spring Valley Water Works, a corporation, sold and conveyed all of its property to the Spring Valley Water Company, a corporation. (Test., pp. 4,616-4,617.) This latter corporation is the plaintiff in the suit No. 13,598 (1904 case). A copy of the deed was introduced in evidence and is complainant's Exhibit No. 103. (Test. p. 4,617.)

Before the taking of evidence, a stipulation was entered into that the witnesses need not be sworn twice, and that all evidence and testimony should be considered as taken separately in each case. The Stipulation was as follows:

"It is hereby stipulated and agreed by and between all the parties in both actions that all the testimony and evidence taken before the Examiner in the case of *The Spring Valley Water Works*, a corporation, Complainant, vs. *The City and County of San Francisco, et al.*, Defendants, No. 13,395, and No. 13,598, in the above entitled court, shall be deemed to be and shall be the same as if taken in both cases, and shall be the same as though taken in each case separately, subject to all legal objections and exceptions of every kind and character otherwise than as not being taken specially in each case, and shall be admitted and used in this case and published and employed on the argument in this case as evidence,—the intention of the parties being that as the testimony in both of said actions for a large or perhaps the greater part thereof will be the same identically, that it is useless to repeat such testimony and evidence, and that therefore the taking of the same in one action shall be deemed to be and shall be

for all purposes of trial and all proceedings in each case the same as if taken separately in both actions, subject always, as aforesaid, to all exceptions and objections, save to the exception and objection of not being taken separately in each case; and it is agreed that the witnesses may be sworn in either or both cases when called upon to testify with the same effect as if sworn separately and examined separately in each case." (p. 7.)

During the taking of Mr. Schussler's testimony, a further stipulation was entered into, to save the necessity of a constant fixing of dates, viz.: that when the present tense was referred to by the witnesses, it should be deemed as referring to the First day of February, 1903, and the First day of February, 1904, respectively. (p. 737.)

Throughout the following brief we will refer to the testimony for the fiscal year 1903, unless there is a specific statement of the fact that we intend to refer to the fiscal year 1904.

The ordinance for 1904-5 was the same as the ordinance for 1903-4 except that the hydrant rate for 1904-5 was one dollar less than the hydrant rate for 1903-4. During the year 1904 there was laid out and invested in permanent improvements, as appears by the affidavit of complainant's, Secretary Ames, in case No. 13,598, the sum of \$680,767.01. The fire hydrants in San Francisco always approximated 4000:—accurately on July 1st, 1903, there were 3972, on July 1st, 1904, there were 4057, on July 1st, 1905, there were 4157—(Booker's test. p. 5851); consequently the reduction of \$1 on the hydrant rate made a difference of \$48,000 in

the annual income of the complainant. As the 1904 ordinance is practically a duplication of the 1903 ordinance, except for hydrant rate and as none of complainant's property went out of existence in 1903, and the permanent improvements in 1903, as shown by the testimony of Mr. Ames, referred to in the affidavit of Mr. Fay in 1904, was \$680,767.01, it must follow that if the 1903 ordinance is unreasonable, the 1904 ordinance is also unreasonable.

It appears from the evidence that the rate of 1904 would have produced \$1,966,496.59 (p. 5834), and the rate for 1903 \$1,943,941.06 (p. 5834)—a difference of \$53,555.53—and it also appears that the amount invested in 1904, and useful for supplying water by complainant, was greater than that in 1903 and, consequently, if the court decides to issue a permanent injunction in the former case, it must also do so in the latter. So with the 1905 case.

The evidence consists of some 7000 pages of typewritten testimony and several hundred exhibits, some of a very complicated character.

Complainant's exhibits number 133—they are described in a table in an addendum to this brief.

The ultimate decision of the court need necessarily be nothing more than to decide whether or not the rate fixed will give a reasonable and fair compensation to complainant for its services; but as the question of rate-fixing recurs annually, and as the action of the Board of Supervisors is of a character that cannot be reviewed by any tribunal (except by way of nullification when unreasonable), and as it necessitates the expenditure

of from \$75,000 to \$100,000 to prepare, present and argue any proceeding in equity having for its object to declare the rate void because of their confiscatory character, it would seem to be the duty of a court of equity to establish three points as questions of law, viz.: 1st, what are the elements of value to be considered by a Board of Supervisors in estimating the value of property used and useful in the production and purveyance of water to the citizens and municipality; 2d, what was that value in February, 1903; and, 3d, what is the proper percentage of return on this valuation.

II. LAW POINTS INVOLVED.

This case was tried on the part of complainant by M. B. Kellogg, Esq., who gave to it the best energies of a wonderfully resourceful mind, reinforced by deep study and a comprehensive grasp of the legal problems involved. The breadth of his learning and the thoroughness of his method have made the duties of the writers of this brief consist practically in compiling the points made by him. His untimely death, after the publication of the testimony, prior to the filing of this brief, has made it necessary for counsel to attempt to re-vitalize the spirit which died with him. Appreciating his high qualities as a lawyer, the consummate skill and patient research exhibited by him in the preparation and presentation of this case and his connection with complainant, as chief counsel for more than a generation, we realize that our efforts will but lamely present a substitute for the brief Mr. Kellogg would

have written. The completeness of the presentation of facts, and the gentlemanly courtesy with which he firmly held to and maintained all principles affecting his client's rights, are embodied in the transcript of the testimony and make a fitting monument to him as one of California's greatest lawyers.

The evidence in this case is so voluminous that in an argument which is necessarily devoted very largely to a review of the testimony, it is almost impracticable to discuss in full the various questions of law presented as they arise.

We have, therefore, thought it advisable for the convenience of both the Court and counsel to discuss the law by itself preliminarily.

We do not attempt to discuss the entire subject matter of rate regulation of public service corporations, but merely to put before the Court a few leading cases which lay down the general principles which are applicable to the issues in this case. For a general review of the entire subject of rate regulation, we refer to the two works of

Beale & Wyman, "Railroad Rate Regulation,"
1906, and

Beale & Wyman, "Cases on Public Service
Companies," 1902.

Upon the application for the preliminary injunction in the cases here under discussion, a brief was written and an argument made for the complainant by the late M. B. Kellogg, Esq. Both the brief and the argument are on file, and we desire this brief to be considered supplementary to the brief and argument referred to.

In that brief and argument will be found abundant reference to the methods adopted by the Board of Supervisors in arriving at values and fixing rates.

We will discuss the law under the following heads:

1. Right of courts to investigate rates.
2. What the Supervisors and City Engineer did consider.
3. Principles of Eminent Domain apply.
4. How values should be determined.
5. What elements of value should be considered:
 - (a) *Element of value as a going concern.*
 - (b) *Element of franchise.*
 - (c) *Element of value because of the ability of the water system to expand for future use and of the property now held for use in immediate future.*
 - (d) *Element of value due to absence of competition.*
 - (e) *Element of value due to physical conditions attending the purveying of water in San Francisco.*
 - (f) *Element of value due to comparative excellence of works, because of skill and foresight in construction acquiring and perfecting of system.*
 - A. *In general.*
 - B. *By way of unification into one interconnected whole.*
 - C. *Because of proximity of supply and absence of equally available supply.*

6. Present value as distinguished from its element Primal Cost.

7. Rate of return.

8. Depreciation as a part of the return.

9. Hazard of the enterprise and the enterprise as such, should be considered in fixing rates.

10. Comparison with rates in other cities.

1. RIGHT OF COURTS TO INVESTIGATE RATES.

The power and duty of a Court to interfere in cases where the authorities, municipal or state, charged with the duty of regulating and fixing rates of public service corporations have attempted to exercise their powers in such a manner that the rates fixed are practically confiscatory or tend to deprive the corporations of their property or the use of it without just compensation, are so well established that it is unnecessary at this time to make extended quotations from the authorities.

If the rates as fixed are unconstitutional because confiscatory, the courts will not hesitate to interfere.

Chicago, Milwaukee and St. Paul Ry. Co. v. Tompkins, 176 U. S. 167, and cases cited.

The power to regulate rates cannot be used as a power to destroy.

Reagan v. Farmers' Loan and Trust Co., 154 U. S. 362;

San Diego Land and Town Co. v. City of National City, 74 Fed. 79;

Palatka Water Works v. City of Palatka, 127 Fed. 161, 166;

R. R. Commission Cases or Stone v. Farmers' Loan & Trust Co., 116 U. S. 307.

Just compensation must be allowed to public service corporations.

San Diego v. San Diego, 118 Cal. 556-568, 572.

A fair return upon the value of their investment must be allowed public service corporations.

Spring Valley Water Works v. City and County of San Francisco, 82 Cal. 286, 305, 307;

Kennebec Water Dist. v. City of Waterville, 54 Atl. 6, 11, 13;

Long Branch Commission v. Tintern Manor Water Co., 62 Atl. 474.

See opposite page, 10a.

The subject of rate regulation has been ably discussed in the following leading cases:

Reagan v. Farmers' Loan & Trust Co., supra;
Chicago, Milwaukee & St. Paul Ry. Co. v. Minnesota, 134 U. S. 418;

New Memphis Gas & C. Co. v. City of Memphis, 72 Fed. 952;

San Joaquin & C. Co. v. Stanislaus Co., 113 Fed. 930, 936. (This case is particularly valuable inasmuch as it discusses the statutory law of California as expressed in the Act of March 12, 1885, Stat. 1885, page 95, which Act was referred to in Judge Morrow's opinion upon the issuance of the preliminary injunction in these cases, *Spring Valley Water Works v. City of San Francisco*, 124 Fed. 574, 587.)

Other cases on the subject generally are:

R. R. Commission Cases, or *Stone v. Trust Co.*, supra;

A rate of return may be unlawful if it *tends* towards confiscation, even though the actual point of confiscation has not been reached.

In the recent case of *Pennsylvania R. R. Co. v. Philadelphia County*, 68 Atl. 676, a late statute of that State prescribing maximum passenger rate of two cents per mile was attacked. It was held that an act unduly reducing rates might be unconstitutional even though these rates were not so low as to be *confiscatory*. Says the Court:

"The direct question has so seldom arisen that it is quite bare of authorities. In other States, and in the absence of any cases of our own, it has been sometimes assumed that to be held invalid the provisions of the statute must be unreasonable to the extent of being confiscatory of the corporation's property or rights, and this phrase was used by the court below. But it is manifest that it is used in a special and qualified sense. *The point of injustice is reached long before that of confiscation*, and to make the word 'confiscatory' really appropriate it must be read, not in the sense of producing actual confiscation, but of having *an inevitable tendency thereto*."

St. Louis & S. F. Railway Co. v. Gill, 156 U. S. 649, 657;

Capital City Gas Light Co. v. City of Des Moines, 72 Fed. 829;

San Diego Land & Town Co. v. National City, 174 U. S. 739, 749;

Brymer v. Butler Water Co., 179 Pa. St. 231; 36 Atl. 249;

And the two very recent cases of:

Consolidated Gas Co. v. City of New York, 157 Fed. 849, decided in the U. S. Circuit Court, Southern District of New York, upon the validity of the eighty cent gas rate in the city of New York; and

Pennsylvania Railroad Co. v. Philadelphia Co., decided by the Supreme Court of Pennsylvania, upon the validity of the two cent per mile railroad passenger rate case (68 Atl. Rep. 676).

2. WHAT THE SUPERVISORS AND CITY ENGINEER DID CONSIDER.

There are cases in which courts have been unwilling to interfere because of their inability to ascertain from the record before them what was the basis upon which values were determined by the public authorities exercising the rate fixing power. No such difficulty presents itself in this case. It is acknowledged by the defendant that the values as fixed by them were those estimated by their city engineer, Mr. Grunsky, eliminating from his estimate, however, two items, viz.:

In 1903, \$1,400,000.00, and in 1904, \$1,500,000.00 for going concern, and \$2,500,000.00 for franchise. The

testimony of Mr. Grunsky is reviewed in the brief and argument on the evidence.

3. PRINCIPLES OF EMINENT DOMAIN APPLY.

“The question of what is just compensation in such a case is, we think, in all respects analogous to the question which arises in every case of appropriation under the power of eminent domain; and it may be reduced to the formula that the public must pay the actual value of that which it appropriates to the public use.”

San Diego Water Co. v. San Diego, 118 Cal. 556, 567.

The power of the municipality to estimate value and to fix a return on complainant's properties, is even greater than is conferred upon the State through the right of eminent domain. If the property was the subject of proceedings for condemnation under the right of eminent domain, the issue as to its value would be the subject of a searching investigation by a court and the determination of an unbiased jury sworn for that purpose. In proceedings to establish rates the supervisors have it within their absolute power to discard from their consideration any element of value which they choose, through whim, mistaken view of law or otherwise. There is no arbiter to decide what elements of value should be considered or what weight should be given to such elements. Under such circumstances is it not the duty of a court of equity to scrutinize the manner in which a conclusion has been reached to determine values? In proceedings in eminent domain the cardinal rule, we believe, is and must be, that the owner is entitled to the value which the property has for the

most advantageous uses to which it may be applied, having reference to the existing and prospective wants of the community.

In the Matter of Furman Street, 17 Wend. 649 at 669-670.

In *Boom Co. v. Patterson*, 98 U. S. 403, the property was taken under condemnation proceedings and the jury assessed its value at \$300.00 for agricultural purposes and \$9,358.33 for boom purposes. It was not being used for boom purposes at the time, but was being condemned for that purpose. Justice Field, speaking for the Court, said:

"In determining the value of land appropriated for public purposes, the same considerations are to be regarded as in a sale of property between private parties. The inquiry in such cases must be, what is the property worth in the market, viewed not merely with reference to the uses to which it is at the time applied, but with reference to the uses to which it is plainly adapted; that is to say, what is it worth from its availability for valuable uses? Property is not to be deemed worthless because the owner allows it to go to waste, or to be regarded as valueless because he is unable to put it to any use. Others may be able to use it and make it subserve the necessities or conveniences of life. Its capability of being thus made available gives it a market value which can be readily estimated.

"So many and varied are the circumstances to be taken into account in determining the value of property condemned for public purposes, that it is perhaps impossible to formulate a rule to govern its appraisalment in all cases. Exceptional circumstances will modify the most carefully guarded rule, but, as a general thing, we should say that the compensation to the owner is to be estimated by reference to the uses for which the property is suitable, having regard to the existing business

or wants of the community, or such as may be reasonably expected in the immediate future.

* * * * *

“Their adaptability for boom purposes was a circumstance, therefore, which the owner had a right to insist upon as an element in estimating the value of his lands.

* * * * *

“The views we have expressed as to the justness of considering the peculiar fitness of the lands for particular purposes as an element in estimating their value, find support in the several cases cited by counsel. Thus, in the matter of *Furman Street*, 17 Wend. 669, where a lot upon which the owner had his residence was injured by cutting down an embankment in opening a street in the City of Brooklyn, the Supreme Court of New York said that neither the purpose to which the property was applied, nor the intention of the owner in relation to its future enjoyment, was a matter of much importance in determining the compensation to be made to him; but that the proper inquiry was, ‘What is the value of the property for the most advantageous uses to which it may be applied?’ ”

And upon this same point we refer to the case of *City of Los Angeles v. Pomeroy*, 124 Cal. 597 at 641-2 (Instruction XXV.)

And see further upon this subject:

Lewis on Eminent Domain, Second Edition, p. 479.

We now approach the subject of what elements should be considered by rate fixing authority in arriving at value.

4. HOW VALUE SHOULD BE DETERMINED.

The investigation must be judicial, and the determination cannot be arbitrary or based upon conjecture, but upon a full and adequate investigation of the facts.

Cumberland Tel. & Tel. Co. v. R. R. Com., 156
Fed. 823 at 828 and 829, and cases cited;
San Diego v. San Diego, 118 Cal. 556, 568.

In making the full and adequate investigation of facts, which is required in every case, the authorities charged with the duty of fixing rates are not justified in considering alone the cost of the property, or any other single element of value, but in all cases many circumstances and many elements of value are to be considered.

In *Smyth v. Ames*, 169 U. S., page 466 at page 546, the Court said:

"We hold, however, that the basis of all calculations as to the reasonableness of rates to be charged by a corporation maintaining a highway under legislative sanction must be the fair value of the property being used by it for the convenience of the public. And, in order to ascertain that value, the original cost of construction, the amount expended in permanent improvements, the amount and market value of its bonds and stock, the present as compared with the original cost of construction, the probable earning capacity of the property under particular rates prescribed by statute, and the sum required to meet the operating expenses, are all matters for consideration, and are to be given such weight as may be just and right in each case. We do not say that there may not be other matters to be regarded in estimating the value of the property. What the company is entitled to ask is a fair return upon the value of that which it employs for the public conveni-

ence. On the other hand, what the public is entitled to demand is that no more be exacted from it for the use of a public highway than the services rendered by it are reasonably worth."

In *Cumberland T. & T. Co. v. Railroad Com.*, 156 Fed. 823, at page 828, it is said:

"The reasonableness and justice of a charge for transportation by a railroad, for example, depends upon a great many facts, most of which are peculiar to each road. What did the railroad actually cost to construct? How much does it cost to operate? Was the road constructed carefully, economically, and properly? Or was it constructed extravagantly and wastefully, with unnecessary expenditure of money? Is the cost of operation only what a prudent and intelligent administration would incur? Or are unnecessary expenses incurred? Is the pay-roll loaded down with high salaries to a few favored, virtually sinecure officials? Or are the salaries only such as are customarily paid in the administration of similar properties of similar magnitude? What is the volume of business done? What are the facts in the locality in which the corporation operates affecting the question whether a decrease in rates will lead to an increase in business? And what, relatively to the increased business, would probably be the increased cost of operation? What amount of business has the company actually done in the past? And what has it actually cost, all things considered, to do this amount of business? What does it cost to maintain the plant of the company in good working order? And what is the best and most economical way to provide for meeting this cost? All these and many other questions of fact must be most carefully investigated and considered before any commission can act intelligently and with any likelihood of success in the matter of establishing 'reasonable and just rates, charges and regulations' for public service corporations. Even when all the facts, which should enter into the discussion and control the decision, have been ascertained with the ut-

most possible care and exactness, the conclusion is still doubtful in many cases.”

And at page 832 it is said:

“In the present case no investigation whatever was made by the commission before they acted. They simply combined two statements contained in the annual report of complainant—the statement as to value of plant and the statement as to net earnings—and from these two amounts figured out what would be a reasonable and just return for the complainant to get from its Louisiana business. This procedure ignores nearly all the elements of the problem, and bases this commission’s solution on an erroneous process. There is no reason in law nor in fact why a court should presume that the commission has by this method of dealing with the problem hit upon rates that are, in fact, reasonable and just.”

In *Kennebec Water Dist. v. City of Waterville*, 54 Atl. 6, at page 11, the Court said:

“The conditions surrounding properties like the one here proposed to be taken are so variant that it is difficult, and in some particulars impossible, to lay down rules of value which will properly apply to all cases without modification. It was intimated in *Ames v. Union Pacific Ry. Co.* (C. C.) 64 Fed., at page 178, that no hard and fast rule could be made applicable to all properties under all conditions.”

See also

Chicago v. Rogers Park Water Co., 73 N. E. 375;

Covington etc. Turnpike v. Sandford, 164 U. S. 578;

Ames v. Union Pacific, 64 Fed. 165 at 179.

See also Statutes of 1885, page 96, Sec. 5, from which we quote as follows:

"In fixing said rates, within the limits aforesaid, at which water shall be so furnished as to each of such persons, companies, associations, and corporations, each of said board of supervisors may likewise take into estimation any and all other facts, circumstances, and conditions pertinent thereto, to the end and purpose that said rates shall be equal, reasonable, and just, both to such persons, companies, associations, and corporations, and to said inhabitants."

5. WHAT ELEMENTS OF VALUE SHOULD BE CONSIDERED.

Stated generally, the evidence in these cases shows without dispute that the property of the complainant used and useful in supplying water to the City of San Francisco and its inhabitants consists of two general divisions, what is known as its Peninsula system, and what is known as its Alameda system.

It is also undisputed that the Board of Supervisors in determining the value of complainant's property and fixing rates adopted and were guided entirely by the estimates of values made by the City Engineer, Mr. Grunsky, and that Mr. Grunsky in making those estimates carried out two different theories in arriving at value.

As to the *Peninsula system*, he made an estimate of value based upon his estimate of what it would cost to reproduce the separate systems of which it was composed. For example, he estimated the cost of reproduction of the Pilarcitos system separate and apart from the cost of reproduction of the Crystal Springs system and of the San Andres system.

As to the *Alameda system*, however, he followed the method of estimating its value by its original cost to the complainant as farming land, although at the time he made his estimate it was *then producing about one-half of the water used in San Francisco*. As a matter of fact, as the evidence shows, it is capable of producing about three times the total amount of water now being used here daily.

We have pointed out in our argument on the evidence what value Mr. Grunsky would have arrived at, had he valued the Alameda system upon the same theory and lines as he valued the Peninsula system. But the point which stands out in this estimate of values is, that Mr. Grunsky arrived at his estimate of the two systems using a different basis of valuation for each. It must also be understood that Mr. Grunsky disregarded for the purpose of making his estimate any other consideration or basis of value than we have indicated.

In addition to the fact that Mr. Grunsky in estimating the value, did not take into consideration certain matters which he ought to have considered,—the Supervisors went further and eliminated from their consideration certain matters which Mr. Grunsky included in his calculations. (See certified copy of proceedings of the Board on file in this action). It will be seen from those proceedings that Mr. Grunsky, in making his estimates of value, added to the value of complainant's property as estimated upon the lines before referred to, the item of \$2,500,000 as the value of complainant's franchise, and the sum of \$1,400,000 in 1903, and \$1,500,000 in 1904, as the value of complainant's

business as a going concern. Both of these items were eliminated by the Board of Supervisors when they undertook to determine the value of complainant's property. Ever since Mr. Grunsky's estimate was filed, the Supervisors have adhered to his figures; it is therefore most important to the defendant as well as complainant to ascertain once and for all time to avoid future litigation between the parties here if his theories of value are well taken.

It appears therefore that the Board of Supervisors omitted all consideration of the following elements:

- (a) Element of value as a going concern.
- (b) Element of franchise.
- (c) Element of value because of the ability of the water system to expand for future use and of the property now held for use in immediate future.
- (d) Element of value due to absence of competition.
- (e) Element of value due to the physical conditions attending the purveying of water in San Francisco.
- (f) Element of value due to comparative excellence of works, because of skill and foresight in construction acquiring and perfecting system.

That all these elements in estimating the value of complainant's property were proper to be considered, and should have been considered by the Board of Supervisors is abundantly sustained by the authorities which we have cited and will now cite.

(a) ELEMENT OF VALUE AS A GOING CONCERN.

On this point we cite the following cases:

National Water Works Co. v. Kansas City, 62
Fed. 853, 10 C. C. A. 653;

Spring Valley v. San Francisco, 124 Fed. 574,
595;

Cumberland T. & T. Co. v. R. R. Commission,
156 Fed. 823 at 828, 833;

San Diego v. San Diego, 118 Cal. 556, 568
(opinion of Beatty, C. J., at page 588);

Monongahela Navigation Co. v. United States,
148 U. S. 312 at 328;

Kennebec Water Dist. v. Waterville, 54 Atl. 6,
11 at 19;

Galena Water Co. v. City of Galena, 87 Pac.
735, 736, 737;

*Brunswick & T. Water Dist. v. Maine Water
Co.*, 59 Atl. 537, 539-544;

*Long Branch Commission v. Tintern Manor
Water Co.*, 62 Atl. 474;

Gloucester Water Supply Co. v. Gloucester, 60
N. E. 977, 982;

Montgomery Co. v. Schuylkill Bridge Co., 110
Pa. St. 54, 20 Atl. 407;

Consolidated Gas Co. v. City of New York, 157
Fed. 849;

Bristol v. Bristol etc. Water Works, 49 Atl. 974;

Wilkes-Barre v. Spring Brook Water Co., 4
Lack. (Pa.), Leg. News 367.

In *Long Branch Commission v. Tintern etc. Water Co.*, 62 Atl. 474, at page 479, Mr. Justice Brewer says:

"The request that 'under no circumstances can the value of the plant be held to exceed the cost of producing at the present time a plant of equal capacity and modern design' should not be given. Among other things, it leaves out of account the fact that it is the plant of a going concern, and seeks to substitute one of the elements of value for the measure of value itself."

In *Spring Valley v. San Francisco*, 124 Fed. 574, at 595, it is said:

"The complainant next contends that it has an established business as a water company and as a going concern in supplying water to consumers, and that its plant has a value by reason of these advantages beyond the mere cost of reproducing the plant. In support of this view the complainant cites the case of *National Water Works Co. v. Kansas City*, 62 Fed. 853, 10 C. C. A. 653, 27 L. R. A. 827. The opinion is by Mr. Justice Brewer of the Supreme Court. On page 865 he says:

" 'A completed system of water works, such as the company has, without a single connection between the pipes and the streets and the buildings of the city, would be a property of much less value than that system connected, as it is, with so many buildings, and earning, in consequence thereof, the money which it does earn. The fact that it is a system in operation, not only with a capacity to supply the city, but actually supplying many buildings in the city—not only with a capacity to earn, but actually earning—makes it true that 'the fair and equitable value' is something in excess of the cost of reproduction.' "

"This was also a condemnation proceeding, but, as before stated, the principles of compensation applicable to such a case appear to be applicable to the present case."

In *Gloucester Water Supply Co. v. City of Gloucester*, 60 N. E. 977, Atl. 981, the Court says:

"It is plain that the real commercial market value of the property of the water company is, or may be, in fact, greater than 'the cost of reproduction, less depreciation, of the different features of the physical plant.' Take, for example, a manufacturing plant. Suppose one manufacturing plant has been established for some ten years, and is doing a good business, and is sold as a going concern. It will sell for more on the market than a similar plant reproduced physically would sell for immediately on its completion, before it had acquired any business. *National Water Works of New York v. Kansas City*, 10 C. C. A. 653, 62 Fed. 853, 27 U. S. App. 165."

In *Brunswick & T. Water Dist. v. Maine Water Co.*, 59 Atl. 537 at page 539, the Court says:

"Now, what is the property which the district has taken by the power of eminent domain? In the first place it is a structure, pure and simple, consisting of pipes, pumps, engines, reservoirs, machinery, and so forth, with land rights and water rights. As a structure it has value, independent of any use or right to use, where it is—a value probably much less than it cost, unless it can be used where it is; that is, unless there is a right so to use it. Nevertheless it has value as a structure. But, more than this, it is a structure in actual use; a use remunerative to some extent. It has customers. It is actually engaged in business. It is a going concern. The value of the structure is enhanced by the fact that it is being used in, and in fact is essential to, a going concern business. We speak sometimes of a going concern value as if it is or could be separate and distinct from structure value—so much for structure and so much for going concern. But this is not an accurate statement. The going concern part of it has no existence except as a characteristic of the structure. If no structure, no going concern. If a structure in use, it is

a structure whose value is affected by the fact that it is in use. There is only one value. It is the value of the structure as being used. That is all there is of it."

In *Kennebec Water Dist. v. Waterville*, 54 Atl. 6, 11, at page 15, the Court says:

"Plaintiff's request 3 ought not to be given in the form in which it is presented, which is that 'under no circumstances can the value of the plant of the companies be held to exceed the cost of producing at the present time a plant of equal capacity and modern design.' Among other things, it leaves out of account the fact that it is the plant of a 'going concern,' and it seeks to substitute one of the elements of value for the measure of value itself. *Montgomery County v. Bridge Company*, 110 Pa. 54, 20 Atl. 407."

And at page 16:

"The last request is that 'the appraisers shall regard the franchises of the companies as entitling them to continue business as a going concern, but subject to all proper legal duties governing public service companies.' So far, we think the instruction should be given. *National Water Works Co. v. Kansas City*, 10 C. C. A. 653, 62 Fed. 853, 27 L. R. A. 827; *Newburyport Water Co. v. Newburyport*, 168 Mass. 541, 47 N. E. 533."

And at page 19:

"Defendants' request 8 is, in effect, that, in estimating even the structure value of the plant, allowance should be made, in addition to the value as otherwise established, for the fact, if proved, that the water system is a going concern, with a profitable business and good will already established, and with a present income assured and now being earned. We think this instruction, with a modification to be noted, should be given. *Newburyport Water Co. v. Newburyport*, *supra*; *National Water Works Co. v. Kansas City*, *supra*; *Gloucester Water*

Supply Co. v. Gloucester, supra; Bristol v. Water Works, 23 R. I. 274, 49 Atl. 974.

* * * * *

"The defendants, in request 9, ask that in determining the amount to be added to structure value, in consideration of the fact that the system is a going concern, the appraisers should consider, among other things, the present efficiency of the system, the length of time necessary to construct the same *de novo*, the time and cost needed after construction to develop such new system to the level of the present one in respect to business and income, and the added net incomes and profits, if any, which, by its acquirement as such going concern, would accrue to a purchaser during the time required for such new construction, and for such development of business and income. We think this instruction should be given. These are all proper matters for consideration 'among other things.' They are not controlling. Their weight and value depend upon the varying circumstances of each particular case. Of course a plant, as such, already equipped for business, is worth more, if the business be a profitable one, than the mere cost of construction."

In *National Water Works Co. v. Kansas City*, 62 Fed. 853, at page 864, Mr. Justice Brewer said:

"5. The difficult question, however, still remains; and that is, What is 'the fair and equitable value,' which, by the statute and the ordinance, the city is to pay for the water works? This amount was found by the Circuit Court to be \$2,714,000. The company insists that the test is to take the income or earnings, and capitalize them. The earnings pay six per cent on four millions and a half. In other words, the company has produced a property which earns six per cent on four millions and a half; and that, it is claimed, is the fair valuation of the property, six per cent being ordinary interest. On the other hand, the city insists that the franchise has ceased, and that basing the value

upon earnings is in effect valuing a franchise which no longer exists, and which the city is not to pay for; that the true way is to take the value of the pipe, the machinery, and real estate, put together into a waterworks system, as a complete structure, irrespective of any franchise,—irrespective of anything which the property earns, or may earn in the future. We are not satisfied—that either method, by itself, will show that which, under all the circumstances, can be adjudged ‘the fair and equitable value.’ Capitalization of the earnings will not, because that implies a continuance of earnings, and a continuance of earnings rests upon a franchise to operate the water works. The original cost of the construction can not control, for ‘original cost’ and ‘present value’ are not equivalent terms. Nor would the mere cost of reproducing the water works plant be a fair test, because that does not take into account the value which flows from the established connections between the pipes and the buildings of the city. It is obvious that the mere cost of purchasing the land, constructing the buildings, putting in the machinery, and laying the pipes in the streets,—in other words, the cost of reproduction—does not give the value of the property as it is to-day. A completed system of water works such as the company has, without a single connection between the pipes in the streets and the buildings of the city, would be a property of much less value than that system connected, as it is, with so many buildings, and earning, in consequence thereof, the money which it does earn. The fact that it is a system in operation, not only with a capacity to supply the city, but actually supplying many buildings in the city,—not only with a capacity to earn, but actually earning,—makes it true that ‘the fair and equitable value’ is something in excess of the cost of reproduction. The fact that the company does not own the connections between the pipes in the streets and the buildings—such connections being the property of the individual property-owners—does not militate against the proposition last stated, for who would care to buy or at least give a large price for, a waterworks system without a single

connection between the pipes in the streets and the buildings adjacent. Such a system would be a dead structure, rather than a living and going business. The additional value created by the fact of many connections with buildings with actual supply and actual earnings, is not represented by the mere cost of making such connections. Such connections are not compulsory, but depend upon the will of the property-owners, and are secured only by efforts on the part of the owners of the water works and inducements held out therefor. The city, by this purchase, steps into possession of a waterworks plant,—not merely a completed system for bringing water to the city, and distributing it through pipes placed in the streets, but a system already earning a large income by virtue of having secured connections between the pipes in the streets and a multitude of private buildings. It steps into possession of a property which not only has the ability to earn, but is in fact earning. It should pay therefor not merely the value of the system which might be made to earn, but that of a system which does earn. Our effort has been to deduce from the volume of testimony that which, in this view of the situation, can be safely adjudged ‘the fair and equitable value.’ ”

In *Galena Water Co. v. City of Galena*, 87 Pac. 735 at page 736, it was said:

“The principal controversy before the referee was whether or not the unexpired franchise granted by the city to the water works company, and the fact that the plant was an established and going concern, should be considered in determining the fair and equitable value of the waterworks system within the meaning of the ordinance.

* * * * *

“We think the District Court erred in excluding from its estimate of the ‘fair and equitable’ value of the waterworks system the sum of \$15,214.73, that being the amount found by the referee to be the value of the plant as a going concern, including the franchise.

A system of water works in a city, without the right to operate there, or without being connected with water takers, and not in a running condition, would be comparatively worthless. The water company was the owner of these important elements of value, and it seems reasonable that they should not be taken without compensation."

(b) ELEMENT OF FRANCHISE.

The fact that the complainant has a franchise for supplying water in San Francisco with a right to charge compensation therefor, and that it does not exist and do business merely by toleration or sufferance, constitutes an element of value which should have been considered.

Spring Valley v. San Francisco, 124 Fed. 574, 587 at 594;

Kennebec Water Dist. v. Waterville, 54 Atl. 6, 11 at 20;

Brunswick & T. Water Dist. v. Maine Water Co., 59 Atl. 537, 539.

From *Consolidated Gas Co. v. City of New York*, 157 Fed. 849, at p. 875, we quote as follows:

"In this case I am compelled to the conclusion that it is necessary to allow the discoverable value of complainant's franchises as part of that capital upon which a fair return must be allowed, because to refuse would disregard views expressed by higher courts regarding the general nature of franchises and regulation proceedings. Instead of attempting to minimize and distinguish the decisions to which I have been referred and many others, it is my duty to follow the method of reasoning there clearly indicated, leaving it to the higher tribunals to make distinctions which, if drawn by the lower court, would in my opinion savor of presumption.

"It is not to be denied that such a franchise as that to place and maintain gas mains in city streets is, (though secondary in its nature and inferior to the primary franchise of corporate existence conferred by the supreme authority), property 'taxable, inheritable, alienable, subject to levy and sale under execution, to condemnation under the exercise of the right of eminent domain and invested * * * with the attributes of property generally.' (*People v. O'Brien*, 111 N. Y. at p. 41); and the same doctrine in language almost as forcible is laid down in *Monongahela Navigation Co. v. United States*, 148 U. S. 312, which case particularly and especially applied it to an instance of condemnation for a public use of the highest order.

"If franchises are to be reckoned with and paid for in condemnation proceedings, must they also be reckoned with and allowed for in cases of rate regulation? The rights of condemnation and regulation are both confessedly exercises of police power. If regulation is to be regarded as *pro tanto* condemnation, then the same train of reasoning which requires compensation for franchises when all the property protected by the franchise is taken away, requires that some compensation shall be left when the earning power only is reduced. This is the crucial point of inquiry, and the highest tribunal has not yet encountered the necessity of answering.

"Yet it was said in *Smyth v. Ames*, *supra*, (p. 544) that the 'apparent value of the property and franchises used by the corporation' was *inter alia* to be considered when determining the rates that might reasonably be charged; and in the same case it was asserted as a general proposition that a 'corporation may not be required to use its property for the benefit of the public without receiving just compensation for the services rendered.' (p. 546). And there can be no doubt that in the schedule of 'its property' the corporation may justly include its franchise. And in the same spirit are the remarks in *Reagan v. Farmers' Loan and Trust Co.*, 154 U. S. 410, although the word 'franchise' is not there used. In that case the proceedings of the Texas

Railway Commission were under review, and how careful those commissioners were in valuing tangible property to the exclusion of franchises may be seen by the remarks of the Interstate Commerce Commission (I. C. C. Rep. 264).

"*San Diego Water Co. v. San Diego*, 118 Cal. 567, was purely a case of rate regulation; and it is there declared that 'the question of what is just compensation in such a case is we think in all respects analogous to the question which arises in every case of appropriation under the power of eminent domain, and it may be reduced to the formula that the public must pay the actual value of that which it appropriates to the public use.' And in the same spirit are the remarks of Morrow, J., in *Spring Valley Water Works v. San Francisco*, 124 Fed. Rep. 594, which was also a case wholly of rate regulation. And this identity of spirit in the two proceedings has been explicitly recognized by this Court upon an application for preliminary injunction in this case (reported 146 Fed. Rep., at 150). I think these cases reveal a line of reasoning which may be summed up thus: It is admitted that if property protected by a franchise is condemned and wholly taken If its earning power be reduced by regulation the value away from its owner, the franchise must be paid for. of the property is *pro tanto* reduced, and since the franchise is property, the value of the franchise is also reduced. Therefore, in some way the value of the franchise at the time of the proposed reduction must be ascertained in order to discover how much it contributed to the earnings before reduction, and how much it suffers in common with other property by reason of the reduction. Indeed, it has been asserted, that when the condemnation is absolute the owners may take the value assessed, reinvest it and take their chances of gain elsewhere, while if the condemnation be but partial and through rate regulation, such owners have no option but to continue to own the property and receive the reduced rates, with the result, that should no allowance be made for the franchise, owners are in a worse position when regulated than when their property is condemned out-

right. (*Ames v. Union Pacific Ry. Co.*, 64 Fed. Rep. 178.) It is obviously true that if franchises have inherent value and yet may be disregarded in regulating rates, it would be an easy matter to regulate profits as near the vanishing point as might be necessary and then condemn property whose franchises had been so practically destroyed by regulation, at a price far below its worth were condemnation instituted without antecedent regulation; and this thought is prominent in 146 Fed. Rep., at 157-8.

"I conclude, therefore, that I am compelled to consider franchises not only as property but as productive and inherently valuable property, and to add their value if ascertainable to complainant's capital account, before declaring the rate of return permitted complainant by the statutes complained of. (See an endeavor to delineate these two species of property in *Kennebec Water District v. Waterville*, 97 Me., at 220.)"

Article 14, Section 2, of the Constitution of California, reads as follows:

"The right to collect rates or compensation for the use of water supplied to any county, city and county, or town, or the inhabitants thereof, is a franchise, and cannot be exercised except by authority of and in the manner prescribed by law."

Article 13, Section 1, of the Constitution of California provides that the word "property" for taxation purposes includes "franchises."

We have pointed out in our argument on the evidence that the complainant was assessed for over five million dollars as the value of the franchise, and we have also pointed out in that argument that this franchise value was eliminated by the Supervisors when they determined the value of complainant's property.

In *Spring Valley v. San Francisco*, 124 Fed. 574 at 593, it was said:

"The complainant contends that an element of value in its corporate property is its franchise. Section 2 of Article 14 of the Constitution of the State provides:

" 'The right to collect rates or compensation for the use of waters supplied to any county, city and county, or town, or the inhabitants thereof, is a franchise, and cannot be exercised except by authority of and in the manner prescribed by law.'

"The Constitution also provides, in Section 1 of Article 13, that all property in the State not exempt under the laws of the United States shall be taxed in proportion to its value, to be ascertained as provided by law; the franchises are declared to be property. Under this constitutional provision and the law passed to carry it into effect, the complainant's franchise is taxed by the city and county of San Francisco at a valuation of \$5,395,233. The defendants claim that this franchise has no element of value as property in use by the complainant in supplying water to the city and county of San Francisco and its inhabitants. This claim appears to be based upon an observation made by Mr. Justice Temple in *San Diego Water Co., v. San Diego*, supra, that:

" 'There is no limit to the number of companies which may bring water into the city. The franchise is freely offered to all in the Constitution. If there are many companies, and thereby the cost of management is increased, this fact would not call for increased rates. The service is worth no more when rendered by ten companies than when one company furnishes all the water.'

"This observation does not appear to have been concurred in by the other members of the court, and it is doubtful if it can be accepted as disposing of the question."

In *Kennebec Water Dist. v. Waterville*, 54 Atl. 6, at page 19, the Court said:

"The defendants' request 11 should be given in this case. It has been given in part already. It is that the value of a franchise depends upon its net earning power, present and prospective, developed and capable of development, at reasonable rates; that the value to be assessed is the value to the seller, and not to the buyer; and that 'just compensation' means full compensation 'for everything or element of value taken.' *Monongahela Nav. Co., v. United States*, supra. The appraisal must be made, having in mind what we have already said concerning the character and duration of the franchise and the reasonableness of rates. While, with these limitations, the owner is entitled to receive the value of franchises, having reference to their prospective use as now developed, and to the future development of their use, consideration must also be had of the fact that further investment may be necessary to develop the use, and of the further fact that at any stage of development the owner of the franchise will be entitled to charge only reasonable rates under the conditions then existing. But subject to such limitations, we think it should be said that the owner is entitled to any appreciation due to natural causes,—such as, for instance, the growth of the cities or towns in which the plant is situated. *Cotting v. Kansas City Stockyards Co.*, (C. C.) 82 Fed. 850.

* * * * *

"Subject to the suggestions we have made under defendants' request 11, their request 13 is approved, and the instruction should be given. It is as follows: 'That in estimating said franchise, and the present and future net earning power included therein, the appraisers should duly weigh the nature and extent of these franchises, rights, and privileges, whether the same are perpetual or otherwise; also, so far as proved, the rights of the Maine Water Company under all existing contracts, and the value thereof; the extent of ex-

isting business, and of the net incomes or revenues now derived or derivable therefrom; the existing demand for new and additional services, and for the development and increase of said business, incomes, and revenues; the past and probable future growth or decay of the territory now served, or capable of being served, under said franchises, in population, in wealth, and in needs and uses for water to be supplied by some water system; and the past and probable future increase or decrease in said net incomes and revenues as affected by these or other surrounding conditions; also the fact that by said taking said water company will be wholly and forever deprived of all said franchises, rights, privileges, earning power, incomes, and revenues, and that it is the duty of said appraisers to make in their sound judgment, just and full compensation to said water company for all the same.'

* * * * *

"It is doubtless true that the property to be taken, both plant and franchises, are to be appraised, having in view their value as property in itself, and their value as a source of income. The physical property has value irrespective of the franchise, and the franchise without reference to the physical property. But these two kinds of value practically shade into each other. The value of the physical property is enhanced by the existence of franchises, which make it usable. The value of franchises is enhanced by the existence of physical property by which they may be profitably exercised. There are these items of property, but only one entire system. There are all of these elements of value, from which is to be estimated the value of the entire property, tangible and intangible, as a whole. The plaintiff is not to take the physical property without the franchises, nor the franchises without the physical property. It will pay one gross sum as an entire value, and take all the property. The consideration of the elements will be useful only as it will enable the appraisers to fix the just compensation to be paid for the entire property as a whole."

In *Bristol v. Bristol & W. Waterworks*, 49 Atl. 974 at page 977, the Court, in discussing the proper method of valuation in a case where the whole property was being taken for public use, said:

“The res to be bought by the town under this option is exactly what would be the subject of purchase by a third party who should offer to buy of the defendant the Bristol Waterworks. It comprises the material plant and the rights possessed by the defendant and exercised in the use of the material plant. If the sale were to be made to some third party, could it be doubted that it would include the franchise derived from the town as well as the engines, pipes, and other property purchased elsewhere? The town has the option to buy, not to extinguish the rights they have given, which, together with other property and rights, make up what the defendant owns. Everything which the defendant can sell to another he can sell to the town. A fair and reasonable price to the town is what would be a fair and reasonable price to any one else. The franchise, therefore, which would have been reduced in case of forfeiture from an exclusive one to a mere privilege which the town might make common to others, is left, in case of purchase, as a part of the property, and must be considered in estimating its value.”

In *Brunswick & T. Water Dist. v. Maine Water Co.*, 59 Atl. 537 at page 539, it is said:

“But, again, it is not only a structure, and a structure being used, but it is a structure built, maintained, and used by authority expressly granted to the company by the State; that is, it was built and is maintained and used by virtue of a franchise or franchises. The structure is lawfully in existence, and may rightfully continue to be used as a going concern structure, until the State determines otherwise. This also makes the structure in use more valuable. It is the difference between a

structure existing by sufferance and one maintained by right.

* * * * *

“What is it, then, that the district is taking, and for which the company is entitled to just compensation? It is a structure in actual use, and with a right on the part of its owner to so use it, and to charge reasonable rates to customers for services rendered. This is all. It is threefold in discussion, but it is single in substance. The district obtains and the company yields its plant, its structure; but it is the structure as being used, with the rights to use it as stated; no less, no more. We apprehend that some difficulty in discussion has arisen from attempting to differentiate in logic what is inseparable in fact. The property taken is a single thing, to which belong certain characteristics which affect its value. The thing cannot be taken without these characteristics. If it is attempted to value the thing separate from its inherent characteristics, elements which add value to the thing are omitted. If these elements are omitted, the owner fails to receive the full and fair value of the thing, and thereby is denied just compensation.

“The petitioner thinks that the property of the company should be valued in entire disregard of its franchise characteristic. It says truly that the company has voluntarily devoted its money and property to a public service; that is, it is doing the work of the State or public. It says that in entering upon the business it put in its money and the State put in the franchises, and that the company ought to be satisfied with the fair present value of what it has itself put into the enterprise, and to receive nothing but the present worth of that actual investment, or, as it would be more accurate to say, the present worth of the mere structure which was created by and represents the actual investment. But, unfortunately for the petitioner’s contention, the State actually gave these franchises, such as they were, to the company.

* * * * *

"And even in cases where, by statute, franchises were not to be included in the valuation, we conceive that it must have been implied that the property was to be valued as rightfully where it was, and rightfully to be used; for what are pipes in the ground worth as pipes, or reservoirs or dams or fixtures, unless they can be rightfully used, and reasonable tolls charged? And these rights are the franchises; at any rate, the most important ones."

(c) ELEMENT OF VALUE BECAUSE OF THE ABILITY
OF THE WATER SYSTEM TO EXPAND FOR FUTURE
USE AND OF THE PROPERTY NOW HELD
FOR USE IN IMMEDIATE FUTURE.

A corporation supplying water is entitled to a fair return or income on the value of not only its property actually in use at the time in supplying water, but also on the value of property which it may have acquired for reasonably expected use in the near or immediate future.

Olmsted v. Morris Aqueduct, 47 N. J. Law 311
at 329;

Slingerland v. Newark, 54 N. J. Law 62, at 69;
23 Atl. 129 at 131;

*Long Branch Commission v. Tintern Manor
Water Co.*, 62 Atl. 474.

In the case last cited, at page 476, the Vice-Chancellor says:

"Now this, I conceive it to be well settled, was their undoubted duty. It was so declared by Mr. Justice Van Syckel, speaking for the Court of Errors and Appeals in *Olmsted v. Morris Aqueduct*, 47 N. J. Law, 311, at page 329, A company, which seeks and ob-

tains a franchise to supply a certain territory with water for public and domestic uses is under a moral, and, in my judgment, a legal obligation to furnish a supply which shall be equal to all emergencies which may be reasonably anticipated, including unusual droughts and unusual conflagrations, and to bear constantly in mind the prospective increase in population and a consequent increased demand for water."

At page 479 he continues:

"The supplying company is, as we have seen, under obligation to keep in advance of the present demand and take liberal account of the probable increase of demand due to increase of population. I think the language of Mr. Justice Dixon, in *Slingerland v. Newark*, 54 N. J. Law, 62, at page 69, 23 Atl. 129, at page 131, is apt on this point: 'It would, of course, be absurd for the city to construct water works adequate only for its present wants, and the prosecutor does not assert that the works now contemplated are unreasonably large in view of the city's prospective growth.' This is in strict accord with what was said (and above referred to) by Justice Van Syckel, in *Olmsted v. Morris Aqueduct*, 47 N. J. Law, 329, as follows: 'In a matter of extreme necessity all contingencies must be provided for, and the supply must be so ample that a lack of water cannot be apprehended.' To the same effect are the more extended remarks of Judge Parker in the Supreme Court in the same case, reported in 46 N. J. Law, 500.

* * * * *

"These considerations lead to the conclusion that the water company when it starts with new works, or a large addition to the original supply, is entitled to an income therefrom somewhat greater than what is due to the cost of work sufficient merely to meet the present demands. I say 'somewhat greater' for I do not mean to be understood as holding that capitalists ought to expect an immediate compensatory income from an enterprise of this character. But on the other hand it

would be manifestly unjust to expect them to invest their money in a plant necessarily larger than present demands require and take as an income therefor such a sum as would satisfy an investment sufficient to meet present demands."

(d) ELEMENT OF VALUE DUE TO ABSENCE OF
COMPETITION.

It is undisputed that the complainant is the only corporation or concern supplying, or at present able to supply, water to the city and its inhabitants, and this should have been taken into consideration by the Board of Supervisors in determining the value of complainant's property.

In *Kennebec Water Dist. v. Waterville*, 54 Atl. 6 at page 15, it was said:

"But the defendants say that the Maine Water Company was 'practically in the enjoyment of an exclusive franchise,' because it had no competitor, although its franchise may not be legally an exclusive one; citing *Gloucester Water Co., v. Gloucester*, 179 Mass. 365, 60 N. E. 977. And we say that the fact that the company was doing its business without competition may and should be considered by the appraisers when they are valuing the property of the defendant as a going concern. That fact is one of the characteristics of the going business, and may enhance its value."

(e) ELEMENT OF VALUE DUE TO THE PHYSICAL
CONDITIONS ATTENDING THE PURVEYING
OF WATER IN SAN FRANCISCO.

The meteorological and topographical conditions existing here, which make it necessary for the complainant to maintain a supply largely in excess and in ad-

vance of present needs for daily and even for annual consumption, should have been considered as an element in determining the valuation of the property.

In *Brymer v. Butler Water Co.*, 179 Pa. St. 231, 36 Atl. at page 251, it is said:

“Some towns are so situated as to make the procurement of an ample supply of water comparatively inexpensive. Some are so situated as to make the work both difficult and expensive. What would be an extortionate charge in the first case might be the very least at which the water could be afforded in the other. The law was correctly stated in the defendant’s request, and the Court was in error in refusing it.”

And this is quoted and approved in

Long Branch Commission v. Tintern Manor Water Co., 62 Atl., 474 at page 478.

(f) ELEMENTS OF VALUE DUE TO COMPARATIVE
EXCELLENCE OF WORKS BECAUSE OF SKILL
AND FORESIGHT IN CONSTRUCTION
AND PERFECTING OF SYSTEM.

A. In general.

B. By way of unification into one interconnected whole.

C. Because of proximity of supply and absence of equally available supply.

A. *In General.*

The various geographical properties have individual values of their own. The several structural properties have individual values of their own. If they have been skillfully handled and brought together, they will pro-

duce one result. If clumsily handled, they will produce another result. If wise foresight has been used in obtaining the properties which command the keys to the situation, the water works will be profitable. If poor judgment has been used, the water works will necessarily be run at a loss.

All these matters should be investigated, and if skill and foresight are demonstrated, value should be given.

"It should be said that those who engage in a public service cannot be put upon quite the same level as those who make mere investments. They are not like the depositors in a savings bank, whose right to draw out is limited to precisely what they have put in, with its earnings. They are, on the contrary, engaged in a business, with the ordinary incidents of a business, with some of the hazards and the hopes of a business. To be successful, they must be wise and prudent, thrifty and energetic. These virtues, if they have them, they impress upon the property, making it more valuable than it otherwise would have been. *Is it to be said that they can have no return for skill and good management? We do not think so.*

"The cost of reproducing railroad property has been suggested as a basis upon which returns should be allowed. But this, while of great assistance in arriving at a just result, could not be taken as an exclusive guide. Many of our railways were built years ago, when the cost of construction was much greater than now. In the development of that industry they have been reconstructed and improved. The first outlay has perhaps been rendered practically worthless, and a railway honestly managed, never having been paid excessive dividends, may actually represent to-day much more money than the present cost of building. Those who originally invested their money in this enterprise, and have kept pace with the public necessities, ought not to be required to bear the entire burden of this shrinkage. Moreover, the value of a railway system

does not depend upon the mere cost of its embankment or its equipment. It is rather a question of location, of connections, of terminal facilities, of enterprises along its line; and shall nothing be allowed to the foresight and ability which have marked out and perfected that system?"

Brunswick, Etc. Dist. v. Maine Water Co., 59 Atl.,
Rep. 537, 540; S. C. 99 Me.

In *City of Danville v. Southern Railway Company*, 8 I. C. C. 409, at page 438, the Interstate Commerce Commission said that they are entitled to a reasonable profit on the ability to conceive and execute a project of this sort.

B. Element of Value Due to Unification Into One Interconnected Whole.

There are, besides, various intangible values, which should have been considered by the Supervisors in estimating the present value of complainant's property. For example, complainant's properties have an additional value by reason of their unification and the flexibility and interchangeability of their several parts, which value could not be properly given in an estimate based on the cost of reproduction of *single units* as unconnected with other units.

A combined system is more valuable than its several parts if proper skill has been used in the combining,—just the same as an arch composed of several stones, including a keystone, with all of its parts properly shaped and in place, is more valuable than the total sum of the cost of its component stones. If this com-

bination has been made with skill, the value of unification is an element of the value of complainant's property.

"Evidence of cost of reproduction will have some tendency to show what is present value. Such cost will not, however, be conclusive. There are other elements to be noticed, which should be considered in fixing present value. * * * Judge Bremer in *National Water Works v. Kansas City* (62 Fed. 853, 865), calls attention to two additional elements,—one that it is a completed structure connected with buildings prepared for use; and the other that the company is a going concern."

Kennebec Water Dist. v. City of Waterville, 54 Atl. 6.

"The condition of the property, the uses to which it may be put, having regard to the existing advantages for making a practical use of the property, are all matters for consideration in estimating the value of the lands."

San Diego Land Co., v. Neale, 88 Cal., 50-66.

"It is plain that the real, commercial, market value of the property of the water company is, or may be, in fact, greater than the cost of duplication, less depreciation of the different features of the physical plant."

Water Supply Co., v. Gloucester, 179 Mass., 365-382.

"It has value as a structure. * * * There is only one value. It is the value of the structure as being used. * * * The property taken is a single thing to which belong certain characteristics which affect its value. The thing cannot be taken without these characteristics. If it is attempted to value the thing separate from its inherent characteristics, elements which add value to the thing are omitted."

Brunswick, Etc., Water Dist., v. Maine Water Co., 59 Atl., 537.

C. Because of Proximity of Supply and Absence of Equally Available Nearby Supply.

Complainant, through pioneering industry, owns all of the water producing properties close to San Francisco, and they are all necessary either for the present or immediate future use, defining "immediate future" in connection with a growing metropolitan city.

The New York Court held that inquiry into possible available sources was proper to show the value of exclusiveness of source.

Trustees of the Village of College Point v. Dennett, 2 Hun. 669.

"Appellants, in order to show the lake as a source of water supply to cities and villages, asked a question, to show that but one other pond, suitable for such a supply, existed within a radius of six miles. The question was objected to and excluded. * * * Held, that the rejection of this evidence was error."

In an Arkansas case the Court held:

"The landowner should be allowed to state, and have his witnesses state, every fact concerning the property which he would naturally be disposed to adduce in order to place it in an advantageous light if he were attempting to negotiate a sale of it to a private individual.

"* * * The probable demand that there may be for suburban land, for depot and bridge sites, is a recognized factor in the market value of the property. * * * Of course, it does not follow that because a particular spot of ground constitutes a good bridge site, that it therefore has great market value. * * * This probability is an essential condition of value in such cases. * * * If its principle value consisted in its advantages for bridge purposes, it can hardly be claimed that the jury went beyond the estimate of the witnesses."

Little Rock R. R. Co. v. Woodworth, 4 Am. St. Rep., 51-60.

"It was proper for the jury to consider the purposes for which the lands were used, whether they were adapted to that particular use, whether the lands were profitable and valuable for that use, and, in so far as the particular use to which the lands were or had been appropriated added to their market value, that might be considered by the jury. If the lands were valuable as located, bordering on or near the river, as it is contended they were, for a saw-mill, planing-mill, or factory of any description, or for any other purpose, the testimony tending to prove such purpose was proper for the consideration of the jury in passing upon the fair market value of the property taken or damaged."

Dupuis v. Chicago & N. W. Ry. Co., 3 N. E. Rep. 722.

6. PRESENT VALUE AS DISTINGUISHED FROM ITS ELEMENT PRIMAL COST.

In ascertaining the value of complainant's property used and useful in supplying the City of San Francisco and its inhabitants with water the public authority concerned with rate fixing must determine its present value.

Its present value is not to be arrived at by a consideration merely of the original cost, nor of what it would cost to reproduce it, nor of what would be the cost of a substitutional system. Any one of these is but one of the factors or elements which with many others that can be suggested, are to be taken into consideration in determining present value.

Ames v. Union Pac. Railroad Co., 64 Fed. 165-176, 179.

In the case of *San Diego Land Co. v. National City*, 74 Fed. 79, at page 83, the Court said:

"In the solution of that problem many considerations may enter; among them, the amount of money actually

invested. But that is by no means, of itself, controlling, even where the property was at the time fairly worth what it cost. If it has since enhanced in value, those who invested their money in it, like others who invest their money in any other kind of property, are justly entitled to the benefits of the increased value. If, on the other hand, the property has decreased in value, it is but right that those who invested their money in it and took the chances of an increase in value, should bear the burden of the decrease. In my judgment, it is the actual value of the property at the time the rates are to be fixed that should form the basis upon which to compute just rates; having, at the same time, due regard to the right of the public, and to the cost of maintenance of the plant and its depreciation by reason of wear and tear. If one has property to sell, it is its present value that is looked to, one element of which may very properly be its cost; but one element only. So, too, if one has property to lease, it is its present value, rather than its cost, upon which the amount of rent is based. And if, as said by Mr. Justice Brewer, in *Ames v. Railway Co.*, supra, the public were seeking to condemn the property in question for a greater public use, if that be possible, its present value, and not its cost, is that which the public would have to pay. It follows, I think, that, where the public undertakes to reduce the rates to be charged for the use of such property, it is its present value, and not its cost, that must be taken as a basis upon which to fix reasonable and just rates; having due regard to the cost of its maintenance, to its depreciation by reason of wear and tear, and also to the rights of the public. If, upon such a basis, a fair interest is allowed, no just cause of complaint can exist."

And we quote again from the case of *Consolidated Gas Company v. City of New York*, 157 Fed. 849, at p. 854, as follows:

"As to the realty, the values assigned are those of the time of inquiry; not cost when the land was acquired for the purposes of manufacture, and not the cost to

the complainant of so much as it acquired when organized in 1884, as a consolidation of several other gas manufacturing corporations.

"It is objected that such method of appraisement seeks to confer upon complainant the legal right of earning a fair return upon land values which represent no original investment by it; does not indicate land especially appropriate for the manufacture of gas; and increase apparent assets without increasing earning power.

"Analogous questions arise as to plant, mains, services and meters; the reported values whereof are the reproductive cost less depreciation; and not original cost to the complainant or its predecessors.

"It appears by undisputed evidence that some of these last items of property cost more than new articles or the same kind would have cost at the time of inquiry; that some are of designs not now favored by the scientific and manufacturing world, so that no one now entering upon a similar business would consider it wise to erect such machines or obtain such apparatus. In every instance, however, the value assigned in the report is what it would cost presently to reproduce each item of property, in its present condition, and capable of giving service neither better nor worse than it now does.

"As to all of the items enumerated, therefore,—from real estate to meters inclusive,—the complainant demands a fair return upon the reproductive value thereof, which is the same thing as the present value properly considered.

"To vary the statement; complainant's arrangements for manufacturing and distributing gas are reported to be worth the amounts above tabulated if disposed of (in commercial parlance) 'as they are.'

"Upon authority, I consider this method of valuation correct. What the court should ascertain is the 'fair value of the property being used.' (*Smyth v. Ames*, 169 U.S. at 546); the 'present' as compared with 'original' cost (*ibid.* p. 547); and what complainant 'employs for the public convenience' (*ibid.* p. 547); and it is also the 'value of the property at the time it is being

used' (*San Diego Land Co. v. National City*, 174 U. S. at 757. And see also *Stanislaus Co. v. San Joaquin Co.*, 192 U. S., 201.)

"It is impossible to observe this continued use of the present tense in these decisions of the highest Court without feeling that the actual or reproductive value at the time of inquiry is the first and most important figure to be ascertained; and these views are amplified by *San Diego Land Co. v. Jasper*, 110 Fed. Rep., at p. 714, and *Cotting v. Kansas City Stock Yards*, 82 Fed. Rep. at p. 854, where the subject is more fully discussed.

"Upon reason, it seems clear that in solving this equation the plus and minus quantities should be equally considered, and appreciation and depreciation treated alike. Nor can I conceive of a case to which this procedure is more appropriate than the one at bar. The complainant by itself and some of its constituent companies has been continuously engaged in the gas business since 1823. A part of the land in question has been employed in that business for more than two generations, during which time the value of land upon Manhattan Island has increased even more rapidly than its population. So likewise the construction expense not only of buildings but of pipe systems under streets now consisting of continuous sheets of asphalt over granite—has enormously advanced.

"The value of the investment of any manufacturer in plant, factory or goods, or all three, is what his possessions would sell for upon a fair transfer from a willing vendor to a willing buyer; and it can make no difference that such value is affected by the efforts of himself or others; by whim or fashion; or (what is really the same thing) by the advance of land values in the opinion of the buying public. It is equally immaterial that such value is affected by difficulties of reproduction. If it be true that a pipe line under the New York of 1907 is worth more than was a pipe line under the City in 1827, then the owner thereof owns that value; and that such advance arose wholly or partly from difficulties of duplication created by the City itself is a matter of no moment.

"Indeed, the causes of either appreciation or depreciation are alike unimportant, if the fact of value be conceded or proved; but that ultimate inquiry is often times so difficult, that original cost and reasons for changes in value become legitimate subjects of investigation, as checks upon expert estimates or bookkeeping inaccurate and perhaps intentionally misleading. (cf. *Ames v. Union Pacific R. R.*, 64 Fed. Rep. at p. 178-79.)

"If fifty years ago, by the payment of certain money, one acquired a factory and the land appurtenant thereto, and continues to-day his original business therein, his investment is the factory and the land, not the money originally paid; and unless his business shows a return equivalent to what land and building, or land alone, would give if devoted to other purposes (having due regard to cost of change), that man is engaged in a losing venture and is not receiving a fair return from his investment,—i. e., the land and building. The so-called 'money value' of real or personal property is but a conveniently short method of expressing present potential usefulness, and 'investment,' becomes meaningless if construed to mean what the thing invested in cost generations ago. Property whether real or personal is only valuable when useful; its usefulness commonly depends on the business purposes to which it is or may be applied. Such business is a living thing, and may flourish or wither, appreciate or depreciate; but whatever happens, its present usefulness, expressed in financial terms, must be its value.

"As applied to a private merchant or manufacturer the foregoing would seem elementary; but some difference is alleged to exist where the manufacturer transacts his business only by governmental license,—whether called a franchise or by another name. Such license, however, cannot change an economic law, unless a different rule be prescribed by the terms of the license; which is sometimes done. No such unusual condition exists here; and in the absence thereof it is not to be inferred that any American Government intended, when granting a franchise, not only to regulate the business transacted

thereunder, and reasonably to limit the profits thereof, but to prevent the valuation of purely private property in the ordinary economic manner; and the property now under consideration is as much the private property of this complainant as are the belongings of any private citizen. Nor can it be inferred that such government intended to deny the application of economic laws to valuation of increments earned or unearned, while insisting upon the usual results thereof in the case of equally unearned, and possibly unmerited, depreciation."

We have stated before that Mr. Grunsky's estimate was based on the original cost of the Alameda system and on the estimated cost of reproduction of the Peninsula system. Neither of these methods of arriving at value was justifiable under the authorities, all of which hold that while these are *elements* proper to be considered, they are *not the only elements* and are *not conclusive or controlling*.

In *Kennebec Water Dist. v. Waterville*, 54 Atl. 6-11, at page 15, the Court said:

"The plaintiff, in request 2, asks that the actual cost of the plant and property, together with proper allowances for depreciation, be declared to be legal and competent evidence upon the question of the present value of the same. We so hold. It is competent evidence, but it is not conclusive. It is not a controlling criterion of value, but it is evidence. *National Waterworks Co. v. Kansas City*, 10 C. C. A. 653, 62 Fed. 853, 27 L. R. A. 827; *Smyth v. Ames*, *supra*; *San Diego Land Co. v. National City*, *supra*; *Cotting v. Kansas City Stockyards Co.*, *supra*; *Westchester Turnpike v. Westchester County*, 182 Pa., 40, 37 Atl., 905; *Griffin v. Goldsboro Water Co.*, 122 N. C. 206, 30 S. E. 319, 41 L. R. A. 240. Of course, this element is subject to inquiry as to whether the works were built prudently, and whether they were built when prevailing prices were high, so

that actual cost, in such respects, may exceed present value. *Reagan v. Farmers' Loan & Trust Co.*, 154 U. S. 362, 14 Sup. Ct. 1047, 38 L. Ed. 1014; *San Diego Land & Town Co. v. National City*, 174 U. S. 739, 19 Sup. Ct. 804, 43 L. Ed. 1154."

And at page 18:

"We hold that the construction cost is admissible, but not controlling, on the question of present value. It must be borne in mind, as said by Mr. Justice Brewer in *National Waterworks Co. v. Kansas City*, supra, that 'original cost' and 'present value' are not equivalent terms,' and that besides the elements of wear and tear, and depreciation in physical structure or in value, the property may have cost more than it ought to have cost. *San Diego Land Co. v. National City*, supra."

And at page 19:

"The Court, in *San Diego Water Co. v. San Diego*, 118 Cal. 556, 50 Pac. 633, 62 Am. St. Rep. 261, 38 L. R. A. 460, holds that the method of fixing present value by ascertaining cost of replacement is not applicable to property of this character, because, chiefly, the construction and development of waterworks is a matter of growth. At the outset the company owning them is a pioneer. It must keep pace with or anticipate municipal growth. The works must be constructed, and usually no reward can be realized by the constructors until some time has elapsed. In the mean time as the city grows, the facilities of building such works are increased, and the cost of construction thereby diminished. But we think that, at the most, these considerations suggest only that other elements are also taken into account in fixing present value. So far as they relate to the original hazard, we have discussed them in an earlier part of this opinion. We think the inquiry along the line of reproduction should, however, be limited to the replacing of the present system by one substantially like it. To enter upon a comparison of the merits of different systems—to compare this one with more

modern systems—would be to open a wide door to speculative inquiry, and lead to discussions not germane to the subject. It is this system that is to be appraised, in its present condition and with its present efficiency.”

And at page 18:

“The present value of the property is of vital importance, for, as we have seen, the value of the property at the time it is being used for the public is one of the elements essential in determining what are then reasonable rates, and question of franchise value depends upon the rates which may reasonably be charged. *San Diego Land Co. v. National City*, supra. We think it will be proper for the appraisers to consider what the existing system can be reproduced or replaced for, because evidence of cost of reproduction will have some tendency to show what is the present value. Such cost will not, however, be conclusive. There are other elements, still to be noticed, which should be considered in fixing present value. In *Newburyport Water Co. v. Newburyport*, the cost of the reproduction of all of that part of the physical plant used in pumping and delivering water, less any depreciation, was considered without objection, and seems to have been approved by the Court. *Gloucester Water Supply Co. v. Gloucester*, 179 Mass. 365, 60 N. E. 977; *Smyth v. Ames*, supra. But the mere cost of reproduction is not enough. Judge Brewer, in *National Waterworks v. Kansas City*, supra, calls attention to two additional elements,—one, that is a completed structure, connected with buildings prepared for use; and the other, that the company is a going concern. He says (page 665, 10 C. C. A., page 865, 62 Fed., 853, 27 L. R. A. 827): ‘Nor would the mere cost of reproducing the waterworks plant be a fair test, because that does not take into account the value which flows from the established connections between pipes and the buildings of the city. It is obvious that the mere cost of purchasing the land, constructing the buildings, putting in the machinery, and laying the pipes in the streets,—in other words, the

cost of reproduction—does not give the value of the property as it is to-day. A completed system of waterworks, such as the company has, without a single connection between the pipes in the streets and the buildings of the city, would be a property of much less value than that system connected, as it is, with so many buildings, and earning in consequence thereof the money which it does earn. The fact that it is a system in operation, not only with a capacity to supply the city, but actually supplying many buildings in the city—not only with a capacity to earn, but actually earning—makes it true that the ‘fair and equitable value’ is something in excess of the cost of reproduction.’ ”

In *San Diego v. San Diego*, 118 Cal. 556, at page 568, the Court said:

“The construction of municipal waterworks is a matter of growth. It is necessary in common prudence, on the one hand, to construct the works of such capacity as to satisfy the needs of the growing city, not only at the moment, but within the near future; and, on the other hand, not to extend them so much as to cast an unnecessary burden on the stockholders, or the present consumers. As such works are a necessity to the city, they must keep pace with, and to some extent anticipate, its growth. When constructed they stimulate to that extent the progress of the city, and tend, like all conveniences, to lower the general cost of production of all things. It results that at least the first water system in any city occupies the position of a pioneer. At any expense the works must be constructed, and usually no reward can be realized by the constructors until some time has elapsed. In the meantime, as the city grows, in part by reason of this very supply of water, the facility of constructing works of all kinds is increased, and the cost of such construction diminished. It would, therefore, be highly unjust to permit the consumers to avail themselves of the plea that at the present time similar works could be constructed at a less cost, as a pretext for reducing the

rates to be paid for the water. The reduced expense, if it be reduced, is due in part at least to the very fact that the city has been provided at the cost of the water company with increased facilities for doing business."

In *Metropolitan Trust Co. v. Houston*, 90 Fed. 683 at page 688, it is said :

"And, even if the State should proceed to appropriate this property for the purpose of taking the same to itself for public use, the location of this road cannot be appropriated, any more than any other property right of a natural person or of a corporation can be appropriated without just compensation. It is therefore not only impracticable, but impossible, to reproduce this road, in any just sense, or according to any fair definition of those terms. And a system of rates and charges that looks to a valuation fixed on so narrow a basis as that shown to have been adopted by the commission, and so fixed as to return only a fair profit upon that valuation, and which permits no account for betterments made necessary by the growth of trade, seems to me to come clearly within the provision of the fourteenth amendment to the constitution of the United States, which forbids that a State shall deprive any person of property without due process of law, or deny any person within its jurisdiction the equal protection of the laws."

In *Milwaukee Electric Ry. & C. Co. v. Milwaukee*, 87 Fed. 577, at page 585, it is said :

"I am satisfied that the property of complainant represents a value, based solely upon the cost of reproduction, exceeding \$5,000,000. And I am further satisfied that this amount is not the true measure of the value of the investment in the enterprise. It leaves out of consideration any allowance for necessary and reasonable investments in the purchase of the old lines and equipments, which were indispensable to the contemplated improvements, but of which a large part was of

such nature that it does not count in the final inventory. No allowance enters in for the large investment arising out of the then comparatively new state of the art of electric railways for a large system, having reference to electrical equipment, weight of rails, character of cars, and the like, of which striking instance appears in the fact that the electric motor which then cost about \$2,500, can now be obtained for \$800; so that work of this class was in the experimental stage in many respects, and the expenditures by the pioneer in the undertaking may not fairly be gauged by the present cost of reproduction. Of the \$5,000,000 and over paid for the acquisition of the old lines, it would be difficult, if not impossible, from the testimony, to arrive at any fair approximation of the share or amount of tangible property which enters into the valuation in this inventory. It does appear that the roadways required reconstruction with new rails and paving, and that the amount stated was actually paid by the investors, making their investment nearly \$9,000,000."

7. RATE OF RETURN.

There can be no dispute that the return to the complainant under the ordinances in dispute must be fair, and that we are entitled to just compensation.

Long Branch Commission v. Tintern Manor Water Co., 62 Atl. N. J. 474;

Spring Valley v. San Francisco, 82 Cal., 286-305;

San Diego Water Co. v. San Diego, 118 Cal. 556-567.

By the California Act of 1885 (Stat. 1885, page 96, Sec. 5) the Supervisors were directed to fix the net annual receipts and profits of water supplying corporations, so that the same should furnish the associations supplying such water an income of not less than six

per cent nor more than eighteen per cent upon the value of the work actually used and useful. This in itself shows the spirit of legislation in this State upon the rate of return.

We have shown in our argument on the evidence that the rates fixed by the ordinance in question will not yield an amount sufficient to pay operating expenses, taxes, depreciation and a fair and just return upon the fair and just value of complainant's properties in use for the supplying of water.

8. DEPRECIATION AS A PART OF THE RETURN.

The matter of depreciation as part of the return was the subject of an argument before this Court at the time the preliminary injunction was granted, and we here repeat what the late Mr. Kellogg there said:

Element of Deterioration.

"As to current expenses, all operating expenses reasonably and properly incurred should be allowed, taxes should be allowed, and the cost of current repairs.

"In addition to this, if there is any part of the plant such as mains, pipes, etc., which, at the end of a term of years—twenty years, for instance—will be so decayed or worn out as to require restoration, an annual allowance should be made for a sinking fund sufficient to replace such a part of the plant, when it is worn out."

Opinion of Beatty, C. J., in *San Diego Water Co. v. San Diego*, 118 Cal. 588.

"The contention of the appellant in the present case is that in ascertaining what are just rates the Court should take into consideration the cost of its plant; the

cost per annum of operating the plant, including interest paid on money borrowed and reasonably necessary to be used in constructing the same; *the annual depreciation of the plant from natural causes resulting from its use*; and a fair profit to the company, over and above such charges for its services in supplying the water to consumers, either by way of interest on the money it has expended for the public use, or upon some other fair and equitable basis. *Undoubtedly, all these matters ought to be taken into consideration, and such weight be given them, when rates are being fixed, as under all the circumstances will be just to the company and to the public.*"

Opinion by Harlan, Justice, in *San Diego Land and Town Co. v. National City*, 174 U. S. 740.

The case of *San Diego Land and Town Co. v. Jasper*, 110 Fed. Rep. 702, does not conflict in any way with the foregoing, because, although it is said in the syllabus that:

"The fact that a board in fixing rates under such statute, made no allowance for the *deterioration* of the plant, does not authorize a Court to declare the rates fixed unreasonable, *although such fact of deterioration should properly be taken into consideration*, since the Court can consider only the final result of the board's action, as embodied in the ordinance and not the methods by which the results were reached."

Because, under the facts in that case, it is apparent that the Circuit Judge reached the conclusion that the board, in fixing the rates, had given all the consideration to the question of deterioration, to which the complainant was entitled, under the particular facts of that special case.

The decision sustains our contention that the element of *deterioration* must be considered by the board, and

must be given "*due consideration*" in fixing rates and in determining their reasonableness, as is therein said by Judge Ross.

Neither can it be said that the opinion of Harlan, J., in this same case, upon appeal, reported in advance sheets of Supreme Court Reporter, vol. 23, No. 11, p. 571, conflicts in any manner with the rule as laid down by Beatty, C. J., in the case of *San Diego Water Co. v. San Diego*, 118 Cal. 588, above quoted.

At pages 573 and 574 of the report of the Jasper case, Holmes, J., says:

"We will say a word about the opposite contention of the appellant, that there should have been an allowance for depreciation, over and above the amount for repairs: From a constitutional point of view, we see not sufficient evidence that the allowance of six per cent on the value set by the Supervisors, in addition to what was allowed for repairs, is confiscatory."

In other words, under all the special facts of that particular case, the Court is not able to say "that it was impossible for a fair-minded board to come to the result which was reached" in regard to an allowance for deterioration, in addition to the allowance made for repairs, or that, if the board did fail to allow an additional reasonable amount for deterioration, this fact was not more than offset in that special case by the present value which the board placed upon the property, and that therefore the Court could not say "from a constitutional point of view," and from the evidence before it, that "the allowance of six per cent on the value set by the Supervisors, in addition to what was allowed for repairs, is confiscatory."

It seems to be clearly established by authority, therefore that an allowance ought to be made for the element of deterioration; and in the case at bar it is indisputably shown that the value of the perishable part of the plant is \$9,800,000, and that the annual deterioration is two per centum, thus making an annual loss to the complainant from this source of \$196,000, for which no allowance in income has been made, under the rates as fixed by the Board of Supervisors.

It must be plain that the authorities quoted are in consonance with common sense and sound reason. In the case at bar we have, in round numbers, \$9,800,000 invested in the perishable part of the plant, and upon that value a rate is made allowing reasonable compensation; that is, a reasonable interest return upon \$9,800,000, but the average life of this structure being (let us say) fifty years, the value is lessened

in 1 year to.....	\$9,600,000;
in 10 years to.....	7,800,000;
in 25 years to.....	4,900,000;
in 50 years to.....	<i>Nothing.</i>

In the meantime, this perishable part of the structure (like every other part of the plant), must be valued each year at its then present value, in fixing rates, and consequently, the complainant would receive a gradually decreasing income during each year upon its original investment, and *at the end of twenty-five years it would be allowed income upon only one-half of the value of the original investment, and at the end of fifty years it would be allowed no income whatever upon the value of the original investment.*

This result is as absurd as it is confiscatory.

The complainant would be allowed no return for the reconstruction of the deteriorated part of its plant, and would be expected to pay out \$9,800,000, in the first instance, upon the *assured certainty* that the value of its investment would dwindle at the rate of \$200,000 a year, and that it would be allowed interest merely upon its constantly shrinking value, and at the end of fifty years to cast up results as follows:

Capital invested \$9,800,000

Returns—

Interest first year on \$9,800,000

Interest second year on . . 9,600,000

Interest third year on . . . 9,400,000

and so on until,

Interest 25th year on 4,900,000

Interest 49th year on 200,000

Interest 50th year on *Nothing.*

Or, in other words, in fifty years \$9,800,000 capital is to be absolutely dissipated and lost, for the return only of interest upon an annual sum regularly decreasing by one-fiftieth of that amount.

Pause for a moment to think of the absurdity of this from the point of view of any commercial venture, and yet, this is exactly what Supervisors Brauhart and Connor contended for in fixing rates under their forced construction and preposterous interpretation of what they called "the law."

If instead of allowing two per cent on the value of the perishable parts we allowed one per cent on all

structural properties, as will be shown hereafter, this depreciation allowance would figure \$198,060.

It has been the practice of the Interstate Commerce Commission to make an allowance for rate-fixing purposes to railroads for the item of depreciation, and we believe that such has been the practice in England before rate-fixing boards.

In the case of *Long Branch Commission v. Tintern Manor Water Co.*, 62 Atl. 474, at page 478 the Court said:

"The basis of all calculation as to the reasonableness of rates to be charged by a public service corporation is the fair value of the property used by it for the convenience of the public. At the same time, the public have the right to demand that the rates shall be no higher than the services are worth to them, not in the aggregate, but as individuals. Summarized, these elemental principles are the right of the company to derive a fair income, based upon the fair value of the property at the time it is being used for the public, taking into account the cost of maintenance or depreciation and current operating expenses, and the right of the public to have no more exacted than the services in themselves are worth."

In *Brymer v. Butler Water Co.*, 179 Pa. St. 231, 36 Atl. 251, it was said:

"The cost of the water to the company includes a fair return to the persons who furnished the capital for the construction of the plant, in addition to an allowance annually of a sum sufficient to keep the plant in good repair, and to pay any fixed charges and operating expenses."

This element of depreciation was also recognized in the following Federal cases:

Milwaukee v. Milwaukee, 87 Fed. 577 at 583;

San Diego Land Co. v. National City, 74 Fed. 81;

San Diego Land and C. Co. v. National City, 174 U. S. 739, at 757.

And see, also,

Wilkes Barre v. Spring Brook Water Supply Co., 4 Lack. (Pa.) Leg. News, 367;

Beale & Wyman on Railroad Rate Regulation, sec. 430.

It must be remembered that the complainant is in this Court seeking relief against the ordinance in question upon the ground that they are confiscatory of complainant's property and violative of complainant's rights secured to it under the United States Constitution. As it is, of course, peculiarly the province of the Federal Courts to determine ultimately all questions arising under the Constitution of the United States, the decisions of the Federal Courts upon such questions are necessarily controlling. Inasmuch as the Federal Courts have decided that the elements of depreciation should be considered in fixing rates, we do not think that the expression found in *San Diego Water Co. v. San Diego*, 118 Cal. at page 574, is binding on this Court.

9. HAZARD OF THE ENTERPRISE AND THE ENTERPRISE
AS SUCH SHOULD BE CONSIDERED IN FIXING
RATES.

The affidavits of the various bankers and brokers, which are part of the evidence, as to what returns should be allowed enterprises of this character have been referred to in our argument on the evidence, and we submit in all confidence that the ordinary commercial interest return or the ordinary interest return on secured mortgages is not a fair or adequate return on the character of the enterprise maintained by the complainant.

Ames v. Union Pacific Ry. Co., 64 Fed. 165, 176, 179;

Milwaukee v. Milwaukee, 87 Fed. 577, 586;

Trustees of Village v. Saratoga Gas, E. L. and P. Co., 107 N. Y. Supp. 341, at 353;

Kennebec Water Dist. v. City of Waterville, 54 Atl. 6, 16;

Brunswick and T. Water Co. v. Maine Water Co., 59 Atl. 537 at 540;

San Diego v. San Diego, 118 Cal. 556 at 568;

City of Danville v. Southern Railway Co., 8 I. C. C. 409, at 438;

Long Branch Commission v. Tintern Manor Water Co., 62 Atl. 474, at 478.

In the case of *Ames v. Union Pacific Railway Company*, 64 Fed. 176, the Court said:

“But the foundation of the idea of reasonableness is justice. That which is unjust cannot be reasonable, and, when the strong arm of the legislature is laid upon

property invested in railroad transportation, it must be so laid as to do justice to such investors. There can be no justice in that which works to such investors a practical destruction of their property thus invested. It must always be borne in mind that property put into railroad transportation is put there permanently. It cannot be withdrawn at the pleasure of the investors. Railroads are not like stages or steamboats, which, if furnishing no profit at one place, and under one prescribed rate of transportation, can be taken elsewhere, and put to use at other places, and under other circumstances. The railroad must stay, and, as a permanent investment, its value to its owners may not be destroyed. The protection of property implies the protection of its value. The authorities on these general propositions are collective in the opinion in the recent case of *Reagan v. Trust Co.*, *supra*, and I need not do more than refer to that case.

* * * * *

“Is there not an element of equity which puts the reduction of rates in a different attitude from the absolute taking of the property by virtue of eminent domain? In the latter case, while only the value is paid, yet that value is actually paid, and the owners may reinvest, and take the chances of gain elsewhere, whereas, if the property is not taken, the owners have no other recourse than to receive the sum which the property they must continue to own will earn under the reduced rates.”

In *Milwaukee v. Milwaukee*, 87 Fed. 577 at page 586, it was said:

“The interest rate fixed in the bonds issued by the company is 5 per cent. The rate which prevails in this market as shown by the uncontroverted testimony, is 6 per cent for real estate mortgages and like securities. If the \$5,000,000.00 basis be adopted, surely a better rate must be afforded for the risks of investment than can be obtained on securities of this class, in which there is no risk.”

In *San Diego v. San Diego*, 118 Cal. 556 at 568, it was said:

"But it is said that those who enter upon any business enterprise undertake the risk of being undersold by those who, coming later into the field, have the advantage of a cheapening of construction. But this is not an ordinary business enterprise. Those who engage in it put their property entirely into the hands of the public. Having once embarked it is beyond their power to draw back. They must always be ready to supply the public demand, and must take the risk of any falling off in that demand. They cannot convert their property to any other use, however unprofitable the public use may become. They have expended their money for the benefit of others, and subjected it to the control of others. That money has, in effect, been taken by the public; and the public, while refusing to return that money, cannot be heard to say that it no longer has need for all of it.

In *Trustees of Village v. Saratoga Gas, E. L. and P. Co.*, 107 N. Y. Supp. 341, at page 353, the Court said:

"The investment in a gas and electric light company, however, is not secured, as is a loan, upon abundant security. There is in it a greater risk of loss, and upon all economic principles the investment should for that reason be entitled to a greater rate of return than an investment loan upon approved security. If the Court should allow to these investors only the same or a less return than is obtained for a loan upon approved security, no capital would henceforth be advanced for these enterprises, and the public would either be deprived of their advantages or the municipality would be compelled to build for itself. Both upon principle and necessity, then, a fair return upon the value of the property actually used is such a return as shall be fair compensation for the risk assumed by the investor in permitting his money to remain in such an enterprise.

The public cannot fairly question this application of the rule, and must pay such rates as will ordinarily yield such return to the stockholders of the public service corporation. The Court is charged, not only with the duty of protecting the public interest, but also with a duty no less solemn of protecting the property rights of those whose moneys are invested in public service corporations."

In *Long Branch Commission v. Tintern Manor Water Co.*, 62 Atl. (N. J.) 474, at page 479, the Court said:

"The reasonableness of the rate may also be affected for a time by the degree of hazard to which the original enterprise was naturally subjected; that is, such hazard only as may have been justly contemplated by those who made the original investment, but not unforeseen or emergent risks. And such allowance may be made as is demanded by an ample and fair public policy. If allowance be sought on account of this element, it would be permissible at the same time to inquire to what extent the company has already received income at rates in excess of what would otherwise be reasonable, and thus has already received compensation for this hazard."

In *Brunswick and T. Water Co. v. Maine Water Co.*, 59 Atl. 537, at page 543, the Court said:

"We do not doubt that, when the worth of a public service of this kind to the public or the customers is spoken of, necessarily one of the elements to be considered is the expense at which the public or customers, as a community, might serve themselves were they free to do so, and were it not for the existence of the practically exclusive franchises of the supplying company. When the worth of the water to a consumer is estimated, we are not limited to the value of water itself, for it is an absolute necessity. Its value has no

limit. Water, speaking abstractly, is priceless; it is inestimable. To sustain life it must be had at any price. And in this respect a public water service differs from all other kinds of public service. In estimating what it is reasonable to charge for a water service—that is, not exceeding its worth to the consumers—water is to be regarded as a product, and the cost at which it can be produced or distributed is an important element of its worth. It is not the only element, however. The individuals of a community may with reason prefer to pay rates which yield a return to the money of other people higher than the event shows they could serve themselves for, rather than make the venture themselves, and risk their own money to lose in an uncertain enterprise. It was said by us in the Waterville case that the investor is entitled to something for the risk he takes, and it is not unreasonable for the consumer to be charged with something on that account. That is one of the things which make up the worth of the water to the customer. The same element enters always into the relations between producer and consumer. But such a consideration as this last one must always be treated with caution. The company is only entitled to fair returns, in any event, and ‘fair’ to the customer as well as to itself.”

10. COMPARISON WITH RATES IN OTHER CITIES.

In our argument on the evidence we maintain that much of the evidence given by Expert Dockweiler is academical because based upon a comparison of rates in operation here with rates in operation elsewhere. It will be remembered that Judge Morrow in his opinion on the preliminary injunction found nothing unfavorable as to the rates here compared elsewhere.

A comparison of rates with other cities is not a proper test unless it also be shown that all conditions of obtaining water and its distribution are the same in all

places. This statement is supported by the following authorities:

Brymer v. Butler Water Co., 179 Pa. St. 231, 36 Atl. 249;

State v. Minneapolis etc. Railway Co., 89 Am. St. Rep. 514, 534;

Morrell v. Union Pacific Railway Co., 6 I. C. C. Rep. 121;

Hopper v. Chicago, M. and St. P. Ry. Co., 60 N. W. 487;

Trustees of Saratoga v. Saratoga Gas etc. Co., 83 N. E. 699.

In *Brymer v. Butler Water Co.*, 179 Pa. St. 231, 36 Atl. 249, at page 251, it was said:

"Some towns are so situated as to make the procurement of an ample supply of water comparatively inexpensive. Some are so situated as to make the work both difficult and expensive. What would be an extortionate charge in the first case might be the very least at which the water could be afforded in the other. The law was correctly stated in the defendant's request, and the Court was in error in refusing it."

In *Morrell v. Union Pacific Ry. Co.*, 6 I. C. C. 121, the Interstate Commerce Commission said:

"1. Rates maintained and which may be reasonable under the conditions existing in one section or part of the country afford no safe criterion by which to measure reasonable charges in other localities where the expense of operating a road and other conditions affecting transportation are widely different."

In *Hopper v. Chicago, M. and St. P. Ry. Co.*, 60 N. W. 487, at page 490, the Court said:

"It requires no argument to show that the charges for carrying a like commodity on another road in Iowa or elsewhere would have no tendency to show the reasonableness of defendant's charges for a shipment of lime from Maquoketa to Sioux City, Iowa, unless the circumstances which must be taken into consideration in fixing the rates inquired about are substantially the same as those applying to the road in controversy. The proper foundation for the introduction of such evidence, even if admissible, was not laid."

III. LAW POINTS INVOLVED IN OBJECTIONS.

During the course of the taking of evidence before the Examiner, complainant reserved a number of objections and exceptions and points of law. Most of these pertain to the weight of certain testimony, which, while material, do not sufficiently affect the vital points of the case to warrant their argument in full at the present time. If the Court agrees with us as to the value of the property in use and useful, any errors in the introduction of testimony as to elements thereof, would only slightly affect the vital point to be established. We will consequently enumerate the law questions involved in these objections, and we feel certain that the Court will recognize the correctness of the points made.

We respectfully submit that the objections to the following questions should be sustained and the mo-

tions to strike out granted in each respective instance for the reasons given by Mr. Kellogg, viz.:

QUESTIONS ASKED MR. C. E. GRUNSKY.

1. "Q. 39. If San Francisco were receiving a water that would be ranked as of first quality, what would be the expected death-rate from typhoid fever, in your opinion?

"Mr. Kellogg. I object to this class of testimony on the ground that it has nothing at all to do with the value, unless you intend to follow it up with a showing that on account of those conditions which you claim exist, the value of the property has depreciated; and, therefore, I move to strike out all the evidence on this subject, and I object to any further evidence on that line as immaterial, irrelevant and incompetent to the question involved in this case, namely rate fixing.

"A. The death-rate should be less than 10 per 100,000 inhabitants." (p. 198, Grunsky.)

2. "Q. 40. Do you know what the death-rate in San Francisco from typhoid fever has been in the last few years?

"Mr. Kellogg. I object to that unless it is confined to the cause—water—and water as the cause of the death-rate from typhoid. I object to it further on the ground that it is a mere insinuation if it is not confined to that specific fact.

"A. The death-rate in San Francisco from typhoid fever is about 30 per 100,000 inhabitants. The cities which have death-rates less than 10 per 100,000 inhabitants are, in almost every case, those which use water from high mountain sources or those which have well-managed filtering plants." (p. 198, Grunsky.)

The last two objections should have been sustained, and this evidence stricken out. It is well known that typhoid fever may result from a great variety of causes, and may be introduced into the human system by multitude of methods,—through food, such as fruits,

vegetables, milk, which have been contaminated by insects, particularly flies, which themselves have been contaminated, and through a thousand and one human agencies. It is a notorious fact besides that the administration of the health affairs of this City has been notoriously lax for years. Mr. Herring (testimony p. 3528), points out some of the causes of contamination. There is not a shred of evidence showing that the water as furnished by complainant ever contained typhoid bacillus, and until the defense negatives the presence of the typhoid bacillus in all other articles of food and drink the evidence is absolutely immaterial, irrelevant and incompetent. Besides the evidence shows that there are numerous private wells in San Francisco; that many consumers of water are supplied entirely by such wells; and it is a matter of common as well as scientific knowledge that wells are the most dangerous sources of typhoid infection.

3. "Q. 42. Are you familiar enough with the conditions surrounding private ownership of water systems and municipally owned water systems to express an opinion as to which is the more advantageous to the people?

"Mr. Kellogg. I object to the question as immaterial, irrelevant and incompetent to any issue involved in this action; on the further ground that no political question is involved in this suit.

"A. I am familiar in a general way." (p. 199, Grunsky.)

4. "Q. 43. Which, in your opinion, is to the greater advantage of the people, a municipally owned and controlled water system or a privately owned and controlled water system?

"Mr. Kellogg. The same objection.

"A. I am in favor of municipal ownership of water works, particularly in California, where the privilege to open streets and lay mains for the purpose of supplying water for domestic use is a constitutional privilege. The selection of the source of supply can usually and it is reasonable to expect that it will be made with greater care by a municipality than by a private company, and the public health will be better safeguarded. A lower interest rate on the capital invested and a lower charge for the service rendered is to be anticipated. If a private company has a monopoly and charges are fixed for long periods of time, earnings may be excessive. If rates are fixed frequently the opportunity for corruption too often has a *disastrous effect upon the public official*. The annual wrangling over rates as witnessed so frequently in San Francisco, *must hamper the private company*, and leaves the citizen under the impression that he is receiving unfair treatment. It would be to this city's advantage to own the water works. This view seems to be in general ascendancy as evidenced by the increased popularity of the feeling in favor of municipal ownership. On this matter, M. N. Baker, in a paper on water works in 'Municipal Monopolies,' edited by E. W. Bemis, gives among others the following figures:

" 'Of the water works in the United States there were

in 1800, owned by municipalities,	6.3 per cent.
" 1820, " " "	16.6 " "
" 1840, " " "	35.9 " "
" 1860, " " "	42.0 " "
" 1880, " " "	49.0 " "
" 1896, " " "	53.2 " "

which indicates the growth of the feeling in favor of municipally owned water works." (pp. 199-200, Grunsky.)

QUESTIONS ASKED EDWIN DURYEA, JR.

5. "Q. 9. Has the Bay Cities Water Company, since your connection with it, offered to sell a system of water supply to the city of Oakland, California?

"Mr. Kellogg. I object to the question as immaterial, irrelevant and incompetent, and not involved in any issue in this action.

"A. It has."

"Q. 10. Was this offer accepted?

"A. It was, by the City Council." (p. 55, Duryea.)

We submit that the entire line of questions as to what offer was made to another city, which offer never culminated in any purchase or use, is irrelevant and immaterial, and that the testimony should be suppressed.

6. "X. Q. 8. And that is the only basis of knowledge you have of the distributing system of the Spring Valley Water Company?

"A. I have a great many published documents, many of them emanating from the Spring Valley Water Company itself,—published in the Municipal Reports, for some years back.

"X. Q. 9. The reports that have been made by the company to the municipality in these investigations is what you have seen?

"A. Yes, sir.

"X. Q. 10. You have never examined the thing yourself at all?

"A. I never have.

"X. Q. 11. You know nothing more about it than what you have read in the Municipal Reports and in the reports of the International Fire Underwriters?

"A. Nothing more.

"Mr. Kellogg. I move to strike out all the testimony of the witness as to the distributing system, upon the ground that it is hearsay and not based on personal knowledge." (p. 72, Duryea.)

7. "X. Q. 120. What rights has the Bay Cities Water Company upon the Coyote?

"A. It has the rights of ownership of certain lands, those lands being the reservoir sites and dam sites; it also has the usual rights in the State of California

which are secured by filing notices and keeping up those notices in the manner prescribed by law.

"X. Q. 121. And that is all they have, is it not?"

"A. That is all they have. That is all that is necessary to have in order to control water.

"Mr. Kellogg. I move to strike that out as a question that the Court will pass upon." (p. 83, Duryea.)

8. "R. D. Q. 4. Give the result of this comparison that you have made.

"A. I have compared the relative number of miles of different size pipe in the distribution system as shown in the report of the Board of Fire Underwriters, made in October, 1905, and in Mr. C. E. Grunsky's estimate of a distributing system for the Tuolumne enterprise."

"Mr. Kellogg. I object further to any testimony upon that subject upon the ground that the report of the National Fire Underwriters is not a verified report and is not competent evidence in this case, and is, therefore, not a basis for any comparison as to the distributing system of the Spring Valley Water Works and that estimated by Mr. Grunsky, and, therefore, immaterial, irrelevant and incompetent, and any testimony on the subject is also immaterial, irrelevant and incompetent." (p. 140, Duryea.)

9. "R. D. Q. 23. Should the cost of the iron plates in San Francisco exceed the $3\frac{1}{4}$ cents per lb. you have estimated, or should the cost of trenching for pipe lines exceed the \$1,000 per mile you have estimated, or should the cost of refilling said pipe line trench exceed the \$250 per mile you have estimated, or should the cost of manufacturing the iron plates into pipe exceed the one cent per lb. you have estimated, in any or all of these cases would the excess of actual cost over your estimates be a loss to the city, or by whom would the loss be, or who would suffer this loss?"

"Mr. Kellogg. I object to the question on the ground that it has no tendency in any reply that could be made to it to establish the value of the Spring Valley

Water Company's plant or its property, or its cost, and, therefore, it is immaterial, irrelevant and incompetent.

"A. In all of these items which you have mentioned any excess of actual over my estimated cost would not increase the cost to the city above the \$25,451,000 which I have given, and would tend only to decrease the profits of the Bay Cities Water Company. I would add to that that the same answer applies to any increase in the cost due to the possible purchase of rights of way necessitated by being unable to place trestles on the County roads." (p. 154, Duryea.)

QUESTIONS ASKED ARTHUR L. ADAMS.

10. "X. Q. 199. Further did you report as follows: 'Water developed by wells on the Pasadena mesa, having no claim to the rights of a stream, and depending only upon the common law principles that the percolating water belongs to the land, and having no strategic advantage over the surrounding land we regard as not having any value in itself other than the market value of the land on which said wells may be located and the cost of the development works, both of which are in this case to be independently estimated.'?"

"Mr. Kellogg. I object to the question on the ground that it eliminates entirely the question of prescriptive title, which is important in every case, and which exists in every instance in the properties owned by the Spring Valley Water Company.

"A. Yes, that was the case down there. The situation was a little peculiar. One of the sources of water supply was a certain recent discovered underground supply, an underground deposit immediately back of Pasadena, and it was being generally assailed by different parties developing water on it. The quantity which it was capable of yielding was comparatively limited in amount. So long as it was possible for one man to sink a well and utilize it regardless of the effect upon his neighbor's well it did not seem that such water rights were worth very much more than the cost of their development." (p. 4920, Adams.)

11. "X. Q. 213. Then, if they [referring to properties gone out of use] cannot and are not considered, would not the fact that they always have been considered in this way, that for very many years an income has been paid upon what they cost, would that not affect the problem as to whether or not rates should be fixed so as to give an income at the present time on anything more than cost?

"Mr. Kellogg. I object to the question on the ground that it is immaterial, on the ground that the rates that were fixed and collected during the years referred to are not in issue in these actions and that only the rates which are involved in the fiscal years embraced within the issues of these actions are to be considered.

"A. Not unless it can be shown that the amount in interest which has been paid upon abandoned structures subsequent to their abandonment has been more than sufficient to liquidate the capital invested in those structures, and unless it can also be shown that, inclusive of such interest allowance on abandoned structures, the net rate of return upon the property value as a whole has been amply adequate, that is, has constituted a reasonable and proper rate of interest return." (pp. 492-6-7, Adams.)

12. "X. Q. 226. In the case of large water works, are they [referring to valuations] not apt to be enormously varied; for instance, you take the methods of the valuation of water works which are set forth in that publication of The American Society of Engineers—in evidence in this case and you are familiar with it undoubtedly—if you take those different methods set down there for arriving at the valuation of water works you would undoubtedly arrive at as many different valuations as there were methods, would you not?

"Mr. Kellogg. I object to the question as immaterial on the ground that the law fixes the method of valuation while the theories that are referred to in the publication mentioned are not sanctioned by the law in all instances.

"A. There are undoubtedly often very considerable differences of opinion as to what constitutes the value of a water works plant. I do not know that that answers your question fully but I am a little uncertain as to how it can be answered completely. There are elements of judgment involved in the determination of water works values and there will always be some difference of opinion where elements of judgment enter in. In the particular article you mention, which I take to be a paper and an accompanying discussion concerning the valuation of the Kansas City Water Works, the question was discussed by a pretty large number of men, many of whom I dare say had never given any very serious thought to the difficulties of the question, and many of them, I think, were men who were not connected in any way and never had been with water works questions." (pp. 4931-2, Adams.)

13. "X. Q. 242. Mr. Adams, in the appendix to your Pasadena report there are certain unit costs given for various kinds of works which were done there and to which I will call your attention.

"Mr. Kellogg. What is the date of that report, Mr. Partridge?

"Mr. Partridge. August, 1900.

"Mr. Kellogg. I object to any interrogation regarding cost as of that date as not being pertinent or relevant to any of the issues in this action as the values of these properties are of a later date and, therefore, the questions would be immaterial, irrelevant and incompetent.

"Mr. Partridge. X. Q. 243. The first one I want to call your attention to, is on the second page of the appendix, under the heading 'West Side Water Company; estimated value of Orange Grove Avenue reservoir; quantities determined by survey.' I notice you put an excavation of 21,425 cubic yards of earth at 25 cents per cubic yard. Was that what you estimated that would cost?

"A. This is the report of a Commission, of which I was member, and this figure was evidently the idea

of the Commission as to the probable cost at that time of doing the particular work designated in that item." (p. 4937, Adams.)

14. "X. Q. 467. And you do not think, do you, that it is fair, for rate-fixing purposes, to estimate the cost of duplicating the structural features?

"Mr. Kellogg. I object to the question on the ground that it involves purely a question of law, and, therefore, is immaterial and irrelevant as a question of fact.

"A. No, I would not determine the value of property, for rate-fixing purposes, by the simple consideration of what it would cost to reduplicate the property at that time." (p. 5000, Adams.)

15. "X. Q. 571. Supposing that a new pipe line were laid from the Pilarcitos reservoir into San Francisco instead of the one that is now there and that has been there for forty years, which would you say was worth the more?

"A. Simply as a pipe line there is no doubt that the new one would be worth more than the old one if it were built of equally good material and equally good workmanship.

"X. Q. 572. I mean as a part of the system, which would you say was worth the more?

"Mr. Kellogg. I object to the question upon the ground that it does not confine its purposed answer to the question of the service rendered for rate-fixing purposes, which is the only question involved in this action.

"A. The new one would be worth more than the old one, other things being equal." (pp. 5022-3, Adams.)

QUESTIONS ASKED MR. J. D. SCHUYLER.

16. "X. Q. 974. You speak of it in your own book on dams. Do you know the dam that was built for supplying that water? You can refresh your memory by an examination of your book.

"A. Yes, the lower Otay dam. I refer here in the foot-note to a contract which may have been the same, which recently was declared void, the Supreme Court having decided that the election for the bonds voted by the city was illegal and invalid.

"X. Q. 975. The contract was entered into for that price, however, was it not? I will hand you what purports to be a certified copy of the contract itself.

"A. The price of four cents per thousand gallons is mentioned as the consideration in the contract you have handed me, yes.

"Mr. Partridge. I will offer that contract in evidence.

"Mr. Kellogg. I object to it as immaterial, irrelevant and incompetent, and that it is not shown that the same conditions existed there in reference to the acquisition and storage of water as exist here." (p. 5649, Schuyler.)

17. "Mr. Partridge. I offer in evidence Mr. Schuyler's report on the value of the plant and water supply of the North Pasadena Land & Water Company, a certified copy, dated April 12, 1905, and certified December 16, 1905.

"Mr. Kellogg. I object to it as immaterial, irrelevant and incompetent and there is no showing that the conditions are the same there as here." (p. 5662, Schuyler.)

QUESTIONS ASKED MR. FREDERICK P. STEARNS.

18. "X. Q. 1127. Do you consider that the company is justified in not undertaking any works until a time has arrived that it is so near the limit of its supply as it is at the present time?

"Mr. Kellogg. I object to that question as having no relevancy at all to the value of the works for rate-fixing purposes, and, therefore, it is incompetent and irrelevant.

"A. I think the company should increase its works as soon as the necessity therefor is shown." (pp. 4488-9, Stearns.)

"X. Q. 1128. Do you think that, taking the situation as it is at the present time, the company is justified in letting matters get into the condition that they are in regard to supply?

"Mr. Kellogg. The same objection as last stated.

"A. I understand that steps have been taken toward getting additional water." (p. 4488, Stearns.)

19. "X. Q. 1160. You think, then, do you, that the people ought to pay the interest on the money that the company borrows to construct a works for the future, and pay the company an income on its increased value also?

"Mr. Kellogg. I object to the question on the ground that it does not take into consideration but one value of the situation for reproduction, and that is the probability of an increased value instead of a decreased value on reproduction, and, therefore, it is irrelevant and immaterial and not complete.

"A. I believe, as I have already stated, that the value of works judiciously built for the future should be included. With regard to changes in the value of work, where the company takes the risk of depreciation it should also have the benefit of any appreciation in the property. In giving testimony in answer to questions last night as to the cost of cast-iron pipe in the past and at the present time I instanced two pipes which were laid as siphons side by side, where one cost \$52 a ton and the other cost \$18 a ton. If a company owned these works and had not been furnishing water under a guarantee of payment of interest on all money expended I should say that that first pipe had depreciated in value from \$52 per ton to \$18 per ton. It takes the chances of both appreciation and depreciation." (pp. 4494-5, Stearns.)

20. "X. Q. 1161. Supposing, Mr. Stearns, that the corporation making expenditures of money for water works is practically guaranteed by statute an income upon the actual cost of its works, then there is no risk, is there?

"Mr. Kellogg. I object to that question as not material to any issue in this case because there is no such guarantee in the present instance.

"Mr. Partridge. I said practical guarantee. I do not mean that the statute says that the company shall receive an income on the cost of its works. The statute of California provides, at least inferentially, that the Board of Supervisors, in fixing rates, shall allow at least an income on the cost of works actually in use; it goes at least that far.

"A. It seems to omit a great many features—the reproduction and the question that has been raised about whether works are in use or not. The cost is only one element." (pp. 4495-96, Stearns.)

21. "X. Q. 1172. You think that the mere fact that the corporation instead of the municipality itself has purchased those lands would entitle it, according to the testimony in this case, to an income equal to thirty times the interest upon the amount of money expended?

"Mr. Kellogg. I object to the question on the same ground, that the witness has expressed no opinion as to the value of these properties.

"Mr. Partridge. That question concedes, for the purpose of the question itself, that the value of these lands is what the company claims it is.

"A. I cannot say as to the number of times, because I do not know as to the facts of the case, but I believe it is entitled to the value of those lands at the present time because it has to assume the risks of the lands either appreciating or depreciating." (pp. 4498-9, Stearns.)

22. "X. Q. 1173. Would you say there was any particular risk in that case, from what you know of the situation over there?

"Mr. Kellogg. I object to the question upon the ground that it is making a specific and a particular tract of land as a distinct method of valuation outside of the whole plant of the company, and that the plant is to be valued as a whole; and that he cannot apply one prin-

ciple to one part of the plant and another principle to another part of the plant, and, therefore, the question is irrelevant and immaterial.

"A. I cannot tell as to the changes which were likely to take place in the value of that particular land, but I think the general principle should be applied in connection with the works as a whole. It might be possible and proper to make some additions and some deductions from the amount that would be given by that general rule which I have laid down, but certain additions ought not be made without deductions are also taken into account." (p. 4499, Stearns.)

QUESTIONS ASKED MR. RUDOLPH HERING.

23. "X. Q. 1245. In the first place, if the city itself acquired it [referring to water-producing land] the city would own it, that is, the citizens would be paying on their own property and they would own the property, would they not?

A. Yes, sir.

"X. Q. 1246. Whereas, in the case I have supposed, the company would own the property. There is that difference, is there not? The rate payers, that is, the people themselves, would profit by the increased value in the land instead of the company? Would not that be so, Mr. Hering?

"Mr. Kellogg. I object to the question on the ground that the premise is not well based because the capital invested in the purchase is the money of the company and not the money of the citizens as the question presupposes.

"A. But there are several assumptions; in the first place, that there is an increased value. I do not know whether there is an increased value. I understood the question was there might be." (pp. 3643-4, Hering.)

24. "X. Q. 1428. Generally speaking, is a municipally conducted system more or less economical in construction than one owned and controlled by a private corporation?

"Mr. Kellogg. I object to that as a question directed toward the next municipal election rather than this case and, therefore, I think it is immaterial.

"A. My answer would depend entirely on the particular municipality and on the particular corporation. I have seen municipal systems that were built and operated abominably bad, extravagant, inefficient; I have seen exactly the same sort of work done by private companies. On the other hand, I have seen municipal works built and operated by cities that were very good, about as well as such works can be designed, built and operated; I have also seen works built and managed by private corporations, and I am including Europe as well as America, that were equally excellent both as to design, construction and management." (pp. 3672-3, Hering.)

25. "X. Q. 1493. Do you think it just or right that the consumer should be compelled to pay a rate which will pay interest upon the value of property which has increased merely from the fact that the difficulties of placing it there have increased?

"Mr. Kellogg. I object to the question on the ground that the matter involved as the basis for fixing rates is present value, and present value is no different in that respect between rate-fixing and sale; therefore the question is immaterial, irrelevant and incompetent.

"A. In case the company had put in some poor pipe, or in case the pipe became tuberculated or corroded from one reason or another, the company would have to replace that pipe under present conditions." (p. 3684, Hering.)

26. "X. Q. 1496. Supposing it is true that it is the custom of the company to charge the cost of relaying a wornout pipe to maintenance; in other words, in fixing rates it is customary for them to have the supervisors allow them the full cost of laying a piece of pipe, where a piece has been worn out.

"Mr. Kellogg. I object to the question upon the ground that the evidence in this case shows that a cus-

tom of that nature does not prevail, and where a new pipe is laid it is charged to new construction, and only repairs are charged to maintenance.

"Mr. Partridge. I had not finished the question: I will start it over again: Supposing it is true that it is the custom of the corporation to charge and collect from the rate-payers, under the head of maintenance or repairs or replacement for any wornout pipe which is replaced in the street or elsewhere; supposing that the company has laid pipes in a street at a time when there was no pavement, and since then a pavement has been placed above it; would you consider it fair and just that the rate-payer should pay a rate which would give an income upon the increased value of that pipe due to the fact that the difficulties of laying it have increased?

"Mr. Kellogg. I object to the question upon the ground that the evidence in this case shows that no such custom prevails, and that all pipe of a character which has been described in the question is, when laid by the company, charged, wholly to new construction, and that to maintenance are only charged repairs; therefore the question is incompetent and immaterial.

"A. If that custom prevails I think I should want to look into the question further before answering whether it would be proper or not to charge the paving. In some cases I can see that it might not be proper, but I cannot answer that question offhand." (p. 3686, Hering.)

27. "X. Q. 1573. Supposing it is true that the study, labor and skill has been labored or has been performed by the officers of the corporation during the years it has been gradually growing into shape, and that officers have received compensation in the form of salaries, which salaries have been paid out of the rates and charged to operating expenses, do you think that an income should be paid upon them again as part of the intangible value of the works?

"Mr. Kellogg. I object to the question on the ground that the compensation to the officers is not in the premise assumed by the witness, but is compensation to the corporation itself.

"A. Those who have placed their money into the undertaking, at the risk of profit or loss, would get the benefit of having employed skillful managers, or they would have to suffer the loss if those managers had built an inefficient plant, or if the conditions of the investment had ended unfortunately. I think I said that the value placed upon the intangible property would be wiped out entirely if conditions were such that the work could be replaced by another at a less cost." (p. 3715-6, Hering.)

28. "X. Q. 1578. You know, do you not, Mr. Hering, that, under the law of California, construing it in the least favorable manner to the corporation, the people of the municipality are bound to provide a sufficient amount of money so as to give the corporation a reasonable income upon all the money that they have reasonably and fairly expended in the construction and the purchase of works in use and useful in supplying water to the people?

"Mr. Kellogg. Was not that proposition disputed by you this morning, Mr. Partridge.

"Mr. Partridge. No sir.

"Mr. Kellogg. I believe you said that was not in the constitution—about the "reasonable." It is not in the constitution. It is implied but it is not in the express letter of the constitution.

"A. I do.

"X. Q. 1579. In that event the investment of their money is absolutely certain to bring a return, is it not?

"Mr. Kellogg. I object to the question on the ground that that is the purpose of this litigation, to establish that very income in a reasonable and fair manner, which, we claim has not been done by the legislative department of the city and county of San Francisco.

"A. It may." (p. 3717, Hering.)

29. "X. Q. 1586. Supposing that the law of this State has at all times guaranteed that the rates should be sufficient?

"Mr. Kellogg. I object to the question upon the ground that under the theory of the defense in this case the Board of Supervisors have the right to fix the rates in their discretion and, therefore, the premise of the question is not founded upon fact.

"Mr. Partridge. That is not my theory of the case. I do not want to sit silent while you ascribe that theory to the defense, Mr. Kellogg, because it is not my theory.

"Mr. Kellogg. It is the theory of the answer, as I read it.

"Mr. Partridge (continuing). Then, would you consider that there had been any real risk attendant upon the investment of capital in these works?

"A. If there was a guarantee, naturally the risks, whatever they might be in such a large work, would be materially reduced. There are some physical risks always and there are risks due to social conditions which, of course, the company would have to take."

"X. Q. 1587. What are the risks due to social conditions?

"A. There might be a disagreement among the parties; there might be a disposition to injure the company, which it may or may not have deserved; possibly there might be some other risks.

"X. Q. 1588. A disposition to injure the company, unless it were attended by a power to injure the company, would not be an attendant risk, would it?

"A. I think the power to fix the rates is a very serious power in that respect.

"X. Q. 1589. I am assuming now that it is not within the power of the governing body of the municipality to fix the rates so low as not to give a fair return upon the investment upon properties in use and useful?

"A. There may be a difference in judgment in such matters. A difference of opinion.

"X. Q. 1590. A difference of opinion would not affect the fact, would it?

"A. Not if you have all the facts.

"Mr. Kellogg. I object to the question, and I desire it inserted before the answer, upon the ground that under the theory of this case, as disclosed by the answer

in this case, it is contended that the Board has the right to fix the valuation at their own arbitrary will, and upon that valuation to allow a rate at their own arbitrary will, therefore, the assumption of the question is not sustained by the contention of the defendant, either as to the theory of the law or the case." (pp. 3719-20, Hering.)

30. "R. D. Q. 22. Mr. Hering, with reference to your re-direct testimony on the subject of the relative cost of water under municipal systems and under private ownership, I desire to ask you if you have examined the 14th Annual Report, for the year 1899, of the Commissioner of Labor, on the subject of water, gas and electric light plants, published by the United States Government, printed by the Government Printing Office in 1900?

"A. I have not.

"Mr. Partridge. I offer in evidence the volume that I have just mentioned, and ask that it be marked Respondent's Exhibit 42.

"Mr. Kellogg. I object to it as immaterial, irrelevant and incompetent to any issue involved in this action." (p. 3973, Hering.)

PROCEDURE FOLLOWED IN ARGUMENT.

1. *History* of rate fixing and actual return from present ordinance. We will include a short paragraph on experts' opinions on excellence of complainant's works to show that there was no reason for reduction of rate.

2. *Preliminary Analysis* of figures. We will attempt to show the Court the main questions involved, and the manner they have been met, in a preliminary discussion so that the reasons for the reference to various elements herein thereafter will appear.

3. *Physical Situation of Complainant's Property.*

We will attempt to explain as succinctly as the enormous enterprise will permit, the physical situation of the properties, and in so far as it possibly can be done, will, in a narrative form describe the properties in the text of the brief, and by a series of foot-notes refer to the testimony warranting the expressions in the text.

4. *Tuolumne or Hetch-Hetchy System.* We will then discuss the Tuolumne system as the next nearest substitutional plant, and incidentally show the difference between the values—both of its physical capacities and financial cost—given by the experts produced by complainant and by defendants.

5. *Witnesses.* We will then discuss the witnesses and the character of the testimony given by them, and eliminate the testimony of such of them as is immaterial because in conflict with the law of the case.

6. *Matters to Be Considered in Valuation.* We will then discuss the several elements to be considered other than physical properties. This will include intangible values (including franchise and value of going concern), proper rate of return and a résumé of methods of valuation.

7. *Valuation of Complainant's Properties.* We will discuss the valuations given by the several experts and their reasons, and résumé of the financial return of the several Ordinances and resultant rate to complainant.

8. *Final Chapter.*

ADDENDA: As the exhibits will undoubtedly be referred to many times during the reading of this brief, and it is generally inconvenient to refer to other portions of the same volume; for convenience we have compiled in a separate volume marked "Addenda," a list of all of complainant's exhibits, and have entered therein photographs and reproductions on a small scale of certain important exhibits; also a list of all tables in this brief, and also a succinct analysis or abstract of the valuations given by complainant's experts.

IV. HISTORY OF RATE FIXING BY BOARD OF SUPERVISORS AND FACTS CONCERNING RETURN ON PRESENT ORDINANCES.

1. IN GENERAL.
2. ORDINANCES IN QUESTION AND THOSE OF IMMEDIATE PRECEDING YEARS.
3. TABLE SHOWING RATES IN 1879 AND 1895.
4. TABLE SHOWING AMOUNT OF EXPENDITURES FOR CONSTRUCTION SPRING VALLEY WATER WORKS, 1888-1904.
5. TABLE SHOWING RATES FIXED BY ANNUAL ORDINANCE FROM 1888 TO 1904, AND AMOUNTS EXPENDED FOR CONSTRUCTION AND BETTERMENT IN SAME YEARS.
6. RECAPITULATION OF THE VARIOUS PERCENTAGES OF INCREASE OF OTHER PUBLIC UTILITIES SINCE THE YEAR 1880.

7. EXPERTS' OPINIONS OF EXCELLENCE OF COMPLAINANT'S WORKS, SHOWING THAT DECREASE OF RATE WAS UNWARRANTED BY SERVICE.

1. IN GENERAL.

The 1903 case (13,395) was the subject of a very painstaking argument and investigation at the time of the issuance of the preliminary injunction, and Judge Morrow, at the time, wrote a very thorough opinion.

Spring Valley Water Works v. City and County of San Francisco, 124 Fed. Rep. 574.

The 1904 case (13,598) was also the subject of close presentation and argument and was decided by Judge Gilbert, who, in a very able opinion, thoroughly discussed the principles involved and sustained the injunction. Unfortunately this opinion was not reported in the *Federal Reporter*, but the same can be found among the papers. See

Spring Valley Water Works v. City and County of San Francisco, Case No. 13,598.

On the trial of the case there was developed practically no conflict between the testimony and the affidavits (including the complaint) referred to in the opinion on the preliminary injunction, except as to the value of Complainant's properties used and useful for producing water, and except as to elements of value of an intangible character, and the proper rate of revenue to be allowed a corporation maintaining this character of properties.

In complainant's opening brief on the motion for preliminary injunction at pages 80-87, complainant enumerated the wrongful acts of the Board of Supervisors and the losses occasioned thereby. The manner in which the property was appraised in 1903 is set forth in detail in that brief at pages 98-135, and the argument that follows as to making a horizontal reduction without reason, set forth from pages 135-145, are hereby referred to again and made part of this brief, and we request the court to refresh its memory from the original brief. The argument therein made that just compensation is an essential element of due process of law (pp. 145-171), expresses our views at the present time, and we hereby refer to it.

The facts are, that prior to the new constitution, under the law of 1858, granting complainant its charter, the rate was fixed by a commission of four, two of whom were to be appointed by the city and two by the Water Company, and in case the four could not agree they should select a fifth commissioner, and if they could not agree upon the fifth, then the sheriff should appoint the fifth commissioner. Without some such compensatory arrangement as this no private enterprise would have entered into the water business. By the new State constitution which went into effect on January 1, 1880, and more particularly the provisions of Article XIV relating to water and water rights, it is provided:

"Section 1. The use of all water now appropriated, or that may hereafter be appropriated, for sale, rental or distribution, is hereby declared to be a public use, and subject to the regulation and control of the state in the manner to be prescribed by law; provided, that

the rates or compensation to be collected by any person, company or corporation in this state for the use of water supplied to any city and county, or city, or town, or the inhabitants thereof, shall be fixed annually by the board of supervisors, or city and county, . . . , by ordinance or otherwise . . . and shall continue in force for one year and no longer. Such ordinances or resolutions shall be passed in the month of February of each year and take effect on the first day of July thereafter. . . . Any person, company or corporation collecting water rates in any city and county . . . otherwise than as so established, shall forfeit the franchises and waterworks of such person, company or corporation to the city and county, or city, or town where the same are collected, for the public use.

"Section 2. The right to collect rates or compensation for the use of water supplied to any county, city and county, or town, or the inhabitants thereof, is a *franchise*, and cannot be exercised except by authority of and in the manner prescribed by law."

In the case of

Spring Valley Water Works v. Schottler, 110

U. S. 347,

the U. S. Supreme Court decided that the change in the manner of fixing rates by substituting the Board of Supervisors for the Commission, provided for in the Act of 1858, was not unconstitutional, and that the manner provided by the State constitution did not take away the Water Company's property without just compensation or due process of law, because "the municipal authorities have been created a special tribunal "to determine what, as between the public and the "company, shall be deemed a reasonable price during "a certain limited period. Like every other tribunal "established by the legislature for such a purpose, their

“duties are judicial in their nature, and they are bound
 “in morals and in law to exercise an honest judgment
 “as to all matters submitted for their official determination. It is not to be presumed that they will act
 “otherwise than according to this rule.”

This decision is final, and despite the fact that this Board of Supervisors is selected by only one party to the contract of buying and selling water, to-wit: the water-buyer, and that they themselves are water-buyers, and that there is no appeal whatsoever from their decision, there has been no tendency on the part of the Board of Supervisors to attempt to follow any of the judicial methods which the Schottler case holds they are presumed to follow.

In the case of

San Diego Water Co. v. San Diego, 118 Cal.
 556, at p. 564, the Supreme Court of California held:

“If the rates are fixed by legislative power, or otherwise than by appropriate judicial proceedings in which full notice and opportunity to appear and defend are given, it is within the province of the courts to review such action to the extent, at least, of ascertaining whether the rates so fixed will furnish some reward for the property used and services furnished. To fix rates that will allow no such reward is to take property for public use without just compensation. To this extent, at least, then, the court was entitled to go in this case. . . . Such a proceeding cannot operate to divest private rights; and though the supreme court of the United States holds it to be a legitimate exercise of governmental powers, that court also holds that when it is carried so far as to deprive any one of his property without just compensation it is an unlawful exercise of

such power, and simply void. The function of the courts is merely to ascertain whether the power has been carried beyond the constitutional limits so fixed; and if such be found to be the case, to declare the acts of the council void. . . . All that they have to consider is, whether in a given case, the result of the council's action will be to take the property of the complaining party without just compensation. That is a mixed question of fact and law to be decided by the court upon the evidence produced before it."

The testimony shows that, when the Board of Supervisors, realized the political power which they held when fixing rates, they immediately left behind them all the principles of judicial investigation.

The remedy which complainant had at command was so cumbersome that it suffered its maltreatment to the limit of endurance rather than incur the expense and serious vexation, both to itself and the general public, of initiating a judicial investigation.

Complainant's properties are of a value in the neighborhood of fifty million dollars. There are only a limited number of experts who are competent to place values on this class of property; such experts are men commanding very large salaries, ranging from \$15,000 to \$25,000 per annum; it would require fully a year or more for them to familiarize themselves with the facts and to make their deductions therefrom. The patient and long suffering of complainant was accepted by the politicians and the Board of Supervisors as an indication of the weakness of complainant's position. Gradually the public was educated up to the almost impossibly absurd theory that a waterworks in a growing community, where the population was increasing

as follows: 1850, 34,000; 1860, 56,000; 1870, 149,000; 1880, 233,000; 1890, 298,000; 1900, 343,000; where contemporaneously the values of real estate were increasing in assessed value as follows: 1860, \$14,172,235.00; 1870, \$69,776,603.00; 1880, \$164,939,604.00; 1890, \$164,546,348.00 plus mortgages, \$70,126,120.00; 1900, \$190,370,155.00 plus mortgages, \$98,054,000.00, —could be maintained at a reducing rate rather than an increasing rate.

The provisions of the Constitution of the State of California, as practically carried out, have occasioned a confiscation of a portion of complainant's property without due or any process of law, and to a denial to complainant of its constitutional right to a trial on questions of fact by an unbiased jury. We say this because the facts warrant such a conclusion, notwithstanding the theories of the Shottler case.

"A condition not a theory" has confronted complainant since the adoption of the constitution of 1879, and we hope to show in this brief that now that complainant cannot expand on its stockholders' money without a change in the policy of the City of San Francisco as to water rates, San Francisco itself must realize that it is confronting a water famine and that it no longer faces "a theory" but a "condition."

The practice in San Francisco, since the adoption of the Charter of 1900, has been that the Board of Supervisors, before fixing rates, obtains a report on values from the Board of Public Works. This report, however, is simply the report of the City Engineer, which the Board of Public Works obtains from that

official, and apparently, without further investigation, reports as its own; it contains only such elements or factors of value as the City Engineer sees fit to recognize; and from this report of one man the Board of Supervisors, in fixing rates, selects only such portions of the factors of value as it desires to use.

A mistake of the Board of Supervisors when fixing water rates, or a wilful, unfair action in an attempt by its members to make political advantage for themselves by curtailing the revenue of a public-service corporation, can be remedied in a practical manner only by the trial of a proceeding such as this, which costs from \$25,000 to \$50,000 to prepare, and more than twice that to try and to brief, and takes from one to three years to hear, with an ultimate decision necessarily postponed until after the then acting Board of Supervisors has gone out of existence and a new rate has been fixed.

The Court cannot take judicial cognizance of the fact that San Francisco's administration was for several years dominated by a millionaire Mayor,—politically ambitious to the extent that he attempted to make political capital with the masses as the one capitalist who would fight the public service corporations,—nor that the succeeding administration was dominated by an attorney in such a way that public service corporations were unable to get proper rates, producing the same result, namely, the fixing of a water rate without a genuinely judicial investigation, but the court must take judicial cognizance of the fact that under our form of government city administrations do change in two years and one administration has no power to control

by its theories the political practice of a succeeding administration, and that the problem to be solved is physically so enormous as to prevent hope of bringing theory and practice together, and, consequently, that reliance on unanimity of action of successive city administrations is so impossible as to make any rule based on that theory of unanimity inequitable.

We will show that this was the theory of City Engineer Grunsky at the time he made his valuation.

When asked whether an allowance should be made for property available for and actually purchased for producing water, although not yet actually producing water which was being then used, he admitted that he had made none, because, according to his theory, "as these properties come into use they will be allowed in any valuation placed upon the works" "plus interest and taxes." (P. 394.)

2. ORDINANCES IN QUESTION AND THOSE OF IMMEDIATE PRECEDING YEARS.

What the several annual ordinances of San Francisco were is shown in the affidavit of Mr. Fay, introduced in the 1904 case.

The ordinances of 1902, 1903 and 1904 are set out in full as exhibits to the various bills of complaint in the cases here argued.

We will now show how the ordinances complained of developed from the ordinances of preceding years, and that while the city has been constantly growing there has been a continuous reduction of rates from

year to year since 1888. In doing this we will, for convenience, refer to each ordinance by the date of the year in which July 1st marks the inception of the operation of the ordinance; that is to say, the ordinance fixing rates for the year which commenced July 1st, 1888, and ended June 30, 1889, will be called the ordinance of 1888, and so on.

The ordinance of 1888 and those of all succeeding years down to and including 1903, were practically on the same formula as that of 1903, the rate only being changed.

In 1888 the rate for the smallest one-story residence was 85 cents monthly instead of 20 cents as in 1903; the rate for a five-story residence with an area of 2000 square feet was \$2.00 monthly instead of \$1.00, and the rate for city hydrants for fire, sewer flushing and park purposes, was \$2.50 per month.

In 1889 the smallest one-story house paid 72 cents monthly and the five-story house \$1.90. In 1890 these rates became 65 cents and \$1.90 respectively. This was changed in 1891 to 50 cents and \$1.90, and this remained unchanged in 1892. In 1893 the smallest one-story house rate remained the same, but the five-story rate was reduced to \$1.60 a month, and this remained the same in 1894. During all these years the rate for hydrants was \$2.50 a month, but the lowest meter rate had been reduced from 16 cents in 1889 to 13 cents in 1894.

In 1895 there came a change. The Board of Supervisors became convinced that hydrants meant convenience and protection to the whole community, whether

householders or rate-payers or not; that such of the general public as were not householders were obtaining water, or the benefits of complainant's water system, without cost to themselves, through the decrease in insurance rates and by reason of the streets being properly watered and parks properly kept up. Acting on this theory the Supervisors cut the rate for the smallest consumers in two, but as a sort of compensation the hydrant rate was increased to \$5.00 a month, so that non-consumers would indirectly contribute to the cost of the water supply through the medium of general taxes. Private rates for 1895 were so reduced that the charge for the one-story house with an area of 400 square feet, was cut from 50 cents to 25 cents, and for five-story buildings of 1800 to 2000 square feet, from \$1.60 to \$1.45. Private bath tubs remained at 35 cents, but public baths were reduced from 80 cents to 70 cents; the rate for horses was reduced from 35 cents to 30 cents, but for cows it remained 15 cents as before; public conveniences were reduced from 75 cents to 65 cents; but the hydrant rate was raised from \$2.50 to \$5.00 a month.

This change was accepted by the Water Company with the tacit understanding between the Board of Supervisors and the company that this compensatory rate of \$5.00 for hydrant would be maintained, although the reduction of the rate for the smallest consumers to 25 cents required the company to supply 8000 homes at a rate, which was hardly as much as it cost to make the collections. The Municipal Reports for 1895, at appendix page 15, contains a comparison between the

rates fixed in 1879 for the various uses of water. That table is as follows:

3. TABLE SHOWING RATES IN 1879 AND 1895 FOR ONE-STORY BUILDINGS.

Square Feet	1879	1895
0- 400	\$2 00	\$0 25
400- 500	2 00	35
500- 600	2 00	45
600- 700	2 00	50
700- 800	2 00	60
800- 900	2 25	70
900-1000	2 50	75
1000-1200	2 75	80
1200-1400	3 00	90
1400-1600	3 25	95
1600-1800	3 50	1 05
1800-2000	3 75	1 15

SPECIAL RATES.

	1879	1895
Private bath tubs	\$1 00	\$0 35
Public bath tubs	2 00	70
Private water-closets	50	25
Public water-closets	2 00	65 and 45
Horses	1 00	30
Boarders and lodgers	25	09
Irrigation per 100 yards	1 00	50

METER RATES.

	1879	1895
Highest rate	\$0 75	\$0 29
Lowest rate	37½	13
Number of rate-payers	20,444	39,355

All these changes were made at the arbitrary will of the Board of Supervisors, without having any

reasonable connection, scientifically or otherwise, with the amount of the receipts or the amount expended for construction. During these years practically no property of the complainant went out of use. Sums of money averaging \$500,000 a year were being expended for new construction and extensions, exclusive of maintenance, but notwithstanding the fact that the city was growing rapidly, the total income was practically the same.

The return from the city for its own water, including hydrants, in 1900 was

\$225,977.39

The return from city in 1901

was\$193,878.97

Less old bills of year 1893

paid that year 30,280.08

\$163,597.89

The return from city in 1902

was\$179,812.76

Less old bills of year 1893

paid that year	18,410.81
--------------------------	-----------

\$161,401.95

The return from city in 1903 was.....\$135,624.70

In 1903 complainant's taxes were (p. 2998).\$319,129.39

In other words, in 1903 complainant paid \$180,000 more in taxes than it received from the city, and in addition, furnished water for fire protection.

The figures in the tabulated statement of receipts and expenditures, as well as the additional amounts expended for new construction and extensions, from 1888

to 1895, are taken from page 13 of the Appendix to the Municipal Reports for the year 1895-6. The figures in the same table for the succeeding years, down to and including 1903, are taken from the Municipal Reports for other years, as follows:

Municipal Reports.....	1899-1900:	p. 24
Municipal Reports.....	1900-1901:	p. 121
Municipal Reports.....	1901-1902:	p. 786
Municipal Reports.....	1902-1903:	p. 942
Municipal Reports.....	1903-1904:	p. 493

The table is as follows:

4. TABLE SHOWING RECEIPTS FROM VARIOUS SOURCES OF SPRING VALLEY WATER WORKS FROM 1888 TO 1904.

RECEIPTS.

Year	From Private Rate-payers.	From City and County.	From Shipping and Other Sources.	TOTAL INCOME.
1888.....	\$1,349,685 90	\$ 72,065 49	\$ 12,498 25	\$1,434,249 64
1889.....	806,733 65	42,775 30	18,011 45	867,520 40
1890.....	1,976,477 60	103,335 92	16,628 24	2,096,441 76
1891.....	1,516,232 54	88,565 66	19,547 87	1,624,346 07
1892.....	1,571,612 33	85,988 13	17,228 50	1,674,828 96
1893.....	1,560,358 43	61,228 15	33,752 46	1,655,339 04
1894.....	1,555,322 05	96,846 33	26,054 63	1,678,223 01
1895.....	1,550,688 67	137,235 73	19,309 75	1,707,234 15
1896.....	1,553,152 59	213,917 73	21,619 84	1,788,690 16
1897.....	1,499,093 48	228,087 07	67,458 10	1,794,638 65
1898.....	1,490,921 55	245,165 50	102,275 00	1,838,362 05
1899.....	1,546,939 02	240,878 77	115,594 06	1,903,411 85
1900.....	1,566,854 45	225,977 39	133,875 45	1,926,707 29
1901.....	1,546,705 15	193,878 87 ¹	132,126 30	1,872,710 32
1902.....	1,666,401 81	179,812 76 ²	134,437 15	1,980,651 72
1903.....	1,787,747 45	135,624 70	152,610 94	2,075,983 09

¹ Includes \$30,280.08 old City and County bills.

² Includes \$18,410.81 old City and County bills.

TABLE SHOWING AMOUNT OF EXPENDITURES FOR CONSTRUCTION
BY SPRING VALLEY WATER WORKS FROM 1888 TO 1904.

EXPENDITURES.

Year	For Operating Expenses	For Taxes.	For Interest.	For Dividends.	TOTALS.	Expended for Construction.
1888	\$361,653 65	\$ 70,624 40	\$443,257 85	\$600,000 00	\$1,475,535 90	\$2,723,251 30
1889	392,709 60	90,661 49	499,266 97	350,000 00	1,332,638 06	388,215 94
1890	432,912 90	86,446 37	527,235 67	700,000 00	1,746,594 94	637,454 18
1891	376,839 06	91,965 35	534,948 82	635,000 00	1,638,753 23	683,196 70
1892	395,387 78	91,935 28	529,339 58	660,000 00	1,676,662 64	235,337 19
1893	391,782 90	96,707 58	542,630 75	663,500 00	1,694,621 23	327,342 32
1894	376,200 01	94,529 92	528,183 42	702,000 00	1,700,913 35	367,781 81
1895	376,825 72	102,155 84	533,738 14	711,000 00	1,723,719 70	485,910 28
1896	394,012 08	127,289 49	540,261 68	679,062 50	1,740,625 75	432,378 20
1897	388,364 27	102,932 05	532,405 42	778,000 00	1,801,701 74	727,957 26
1898	458,750 80	131,282 24	538,629 05	766,500 00	1,895,162 09	1,174,973 13 ^a
1899	444,864 59	196,011 36	579,481 81	716,800 00	1,937,157 67	708,430 44
1900	423,609 52	226,660 02	610,623 32	705,600 00	1,966,492 86	1,079,278 88
1901	469,071 50	203,257 61	641,325 24	529,200 00 ^b	1,842,854 35	974,732 67
1902	454,013 77	236,828 97	676,494 15	588,000 00 ^c	1,955,336 89	735,594 16
1903	519,441 51	321,537 25	719,428 40	529,200 00 ^d	2,089,607 16	680,767 01

^a Dividends for 9 months only.

^b Dividends for 10 months only.

A comparison of these rates will show that since 1895, in the fixing of water rates, there has hardly been a pretense of an attempt to give the Water Company what would be considered a fair and reasonable return upon its investment, or even a living income.

The rates for 1896 remained the same as in 1895, but in 1897 the rates for five-story buildings were reduced from \$1.45 to \$1.20; for public bath tubs from 70 cents to 50 cents; horses and cows, previously rated at 30 cents and 15 cents, were reduced to 20 cents and 10 cents; public conveniences from 65 cents to 50 cents; and the highest meter rate from 29 cents to 28 cents. In 1898 and 1899 these rates remained unchanged, but in 1900 the rate for the smallest one-story house was reduced from 25 cents to 22 cents; five-story buildings were re-

duced from \$1.20 to \$1.08; private baths from 35 cents to 32 cents; public baths from 50 cents to 45 cents; horses and cows from 20 cents and 10 cents to 18 cents and 9 cents; public and private conveniences from 50 cents and 25 cents to 45 cents and 22 cents; and the highest meter rate was reduced from 28 cents to 25 cents and the lowest meter rate from 13 cents to 12 cents, while the minimum rate previously fixed at \$2.00 was reduced to \$1.80 a month; but the hydrant rate remained at \$5.00 a month. This was a horizontal reduction of ten per cent. on all private rates. The fact that the reduction was based on a percentage of ten per cent. is in itself evidence that the rates were not based upon any evidence as to values, but that the supervisors had selected arbitrarily a percentage as a basis of reduction, for it certainly has never been claimed and it could not be claimed that there had been a reduction of ten per cent. or of any other percentage in the value of the properties used by complainant in supplying water.

In 1901 the private rates remained the same, but the public rate for hydrants was changed arbitrarily from \$5.00 a month for each hydrant, to the gross sum of \$80,000.00 a year. As at that time there were about 3000 hydrants in use, this made a rate of about \$2.22 a month per hydrant and a reduction of upwards of \$70,000.00 in the Water Company's total income from this one source alone.

In 1902 the rates were unchanged except that the hydrant rate was again arbitrarily changed from the gross sum of \$80,000.00 a year to \$2.00 a month per hydrant.

In 1903, the Board of Supervisors, again selecting arbitrarily a percentage as the basis of a reduction in the rates, made a second horizontal cut of seven per cent. all along the line of the private rates. One-story houses of 400 square feet were reduced from 22 cents to 20 cents; five-story buildings from \$1.08 to \$1.00; private and public bath tubs from 32 cents and 45 cents respectively to 30 cents and 42 cents; horses and cows from 18 cents and 9 cents to 17 cents and 8 cent, banks from \$5.40 to \$5.02, and so on down the line.

In 1904 the Supervisors cut the hydrant rate further, from \$2.00 to \$1.00 per month, and this was maintained in the 1905 ordinance.

All this time the city was growing with tremendous strides. The experts all testified that the per capita use of water increases as a city grows, which is due partly to the fact that the amount of water used or consumed in sprinkling, leakage, mechanical appliances, and the like, increases with the metropolitan growth, the per capita being estimated by dividing the total number of gallons used by the number of inhabitants. In this way the value of complainant's property, in a city where all other real property increases by leaps and bounds, was forced downwards. The value of land purchased for reservoir sites in 1858, when money was loaned at $2\frac{1}{2}$ per cent per month, instead of increasing, fell below its value in 1893. Complainant, relying upon its Charter of 1858, had invested large sums of money in properties for water producing purposes with a courageous belief that the metropolitan city of California was to grow upon a penin-

sula which had already been shaken by one terrific earthquake, and had been devastated by fire three times. That money, if it had been invested in real estate in the heart of San Francisco, would have multiplied by leaps and bounds, and yet complainant is denied the fruit of its courage by these valuations. The product of this investment, made with this hazard, was one of the principal means whereby other pioneer investors were able to build up a city, because, without water, a city cannot grow. If complainant's money had been invested in loans at the rate of interest then prevailing, it would have more than doubled itself within the first four years of the investment. Every attempt of the complainant to induce the municipal authorities to fix rates to act on the principles laid down by the United States Supreme Court in the Schottler case, instead of meeting with success, was met with public outcry, as if this quasi-public corporation was doing the city a wrong by asking that the Board of Supervisors act like "every other tribunal established by the legislature for such purposes." As suggested in the quotation in the brief filed at the time of the issuance of the temporary restraining order, this Board of Supervisors, instead of acting as a "tribunal to determine what as between the public and the company should be deemed a reasonable price during a certain limited period," acted blindly, with no reason whatsoever. Knowing that over \$600,000 had been added to the permanent investment during the fiscal year 1902-03, they cut the rates horizontally seven per cent, and refused to take into consideration as elements of valua-

tion either the complainant's franchise or the value of its business as a going concern, which latter elements were recommended to it by its own city engineer.

It was impracticable for complainant to take legal proceedings to test the validity of the Ordinance of 1902, because the experts needed at least a year's time to investigate before they could be in position to testify. The extent of the properties and the enormous amount of money invested, made the physical problem too difficult to be solved in the limited time given, yet the properties had by this time been "hammered down" in a gross valuation, \$15,000,000. The complainant realized that in coming into a court of equity, it must be fortified with evidence of the most unimpeachable character to show the enormity of the wrong which it had suffered. Consequently, when the temporary restraining order was issued in 1903, complainant accepted the rate of 1902 as a *modus vivendi* pending the final hearing by the court, not because it did not feel the injustice done by the Ordinance of 1902, but because any other course would apparently be attempting to force a recognition of the facts before proof.

We have compiled a table showing the gradual change of the rates from 1888 to 1904, and below in similar columns, we have shown the amount of money expended in betterments of the plant by way of construction for the same years. This table will show comprehensively that the Board of Supervisors have never followed any judicial or other system in modifying the rates and often times that the decrease was made in the face of an actual necessity for an increase.

The table is as follows (*see opposite next page*):

While complainant has been loyally performing its duty in furnishing water by a system highly commended by all of the experts, including Mr. Grunsky, successive Boards of Supervisors have been taking advantage of the political situation and making capital for themselves and the successive "powers behind the throne" to such an extent that the price of the stock has received, what Mr. Partridge in the trial of the case calls, a "hammering down." As this illustrates the attitude of the city administration, we will quote it. During the cross-examination of the witness, Adams, Mr. Partridge, who was trying the case, asked the question:

"X. Q. 558. You do recognize that the provisions of the state constitution really hammer down the value of the property?"

The affidavit of Mr. Harry Schwartz, the stock-broker, presented by defendants, shows the results of the process of "hammering down." In 1899, the maximum price of Spring Valley stock was $102\frac{3}{4}$; in 1900 it was $99\frac{1}{4}$; in 1901 it was $94\frac{3}{4}$; in 1902 it was $93\frac{1}{2}$; in 1903 it was $88\frac{1}{8}$. Yet during all this time there was being added annually to the permanent investment property costing in the neighborhood of \$500,000.00; and in 1903, at the time that the big decrease was made, the Alameda properties were brought into full operation so as to produce 17,000,000 gallons a day, demonstrating beyond any question that this 600 square miles constituting the Alameda system, was fully as valuable, if not more valuable than the peninsula system.

Mr. Schussler makes this tendency to depreciate the value of complainant's properties appear more com-

5. TABLE SHOWING RATES FIXED BY ANNUAL ORDINANCES FROM 1888 TO 1904 AND AMOUNTS EXPENDED FOR CONSTRUCTION AND BETTERMENT IN SAME YEARS.

	1888-'89	1889-'90	1890-'91	1891-'92	1892-'93	1893-'94	1894-'95	1895-'96	1896-'97	1897-'98	1898-'99	1899-1900	1900-'01	1901-'02	1902-'03	1903-'04	1904-'05
One story (600 to 700 sq.ft.)	\$0 85	\$0 72 (0-500)	\$0 65 (0-500)	\$0 50 (0-500)	\$0 50 (0-500)	\$0 50 (0-500)	\$0 50 (0-500)	\$0 25 (0-400)	\$0 25 (0-400)	\$0 25 (0-400)	\$0 25 (0-400)	\$0 25 (0-400)	\$0 22 (0-400)	\$0 22 (0-400)	\$0 22 (0-400)	\$0 20 (0-400)	\$0 20 (0-400)
Five stories (1800 to 2000)	2 00	1 90	1 90	1 90	1 90	1 60	1 60	1 45	1 45	1 20	1 20	1 20	1 08	1 08	1 08	1 00	1 00
Bath tubs, private.....	41	35	40	40	40	35	35	35	35	35	35	35	32	32	32	30	30
Bath tubs, public.....	94	80	90	90	90	80	80	70	70	50	50	50	45	45	45	42	42
Horse	41	35	40	40	40	35	35	30	30	20	20	20	18	18	18	17	17
Cow	27	23	20	20	20	15	15	15	15	10	10	10	09	09	09	08	08
Water closets, public ...	88	75	85	85	85	75	75	65	65	50	50	50	45	45	45	42	42
Water closets, private....	21	18	25	25	25	25	25	25	25	25	25	25	22	22	22	20	20
Urinal, public	21	18	20	10	10	10	10	10	10	10	10	10	..	09	09	08	08
Urinal, private	11	10	10	05	05	05	05	05	05	05	05	05	..	05	05	05	05
Meters, highest	34	..	25	30	30	..	30	..	29	28	28	28	25	25	25	23	23
Meters, lowest	16	..	16	..	..	..	13	..	13	13	13	13	12	12	12	11	11
Meters, not less than.....	..	..	..	..	4 00	3 00	3 00	2 50	2 50	2 00	2 00	2 00	1 80	1 80	1 80	1 67	1 67
Hydrants	2 50	2 50	2 50	2 50	2 50	2 50	2 50	5 00	5 00	5 00	5 00	5 00	5 00	80,000 00	2 00	2 00	1 00
	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	
Gross revenue	\$1,434,249 64	\$867,520 40	\$2,096,441 76	\$1,624,346 07	\$1,674,828 96	\$1,655,339 04	\$1,678,223 01	\$1,707,234 15	\$1,788,690 16	\$1,794,638 65	\$1,838,362 05	\$1,903,411 85	\$1,926,707 29	\$1,872,710 32	\$1,980,651 72	\$2,075,983 09	
Expended for new construction and extensions	2,723,251 30	388,215 94	637,454 18	683,196 70	235,337 19	327,342 32	367,781 81	485,910 28	432,378 20	727,957 26	1,174,973 13	708,430 44	1,079,278 88	974,732 67	735,594 16	680,767 01	

Mr. Schussler makes this tendency to depreciate the value of complainant's properties appear more comprehensively in his testimony at pages 1528-1537 inclusive, where he shows the relative percentage *increase* of population for the three decades, 1880, 1890 and 1900, and then compares it with the year 1903, and shows that the operating expenses of Spring Valley increased in the same way, that the annual cost of the school department increased in the same way, that the annual cost of the police department increased in the same way, that the annual cost of the fire department increased in the same way, and that the taxes of Spring Valley increased much more rapidly, to-wit: in the decade from 1880 to 1890, 133 per cent, in the next decade, 511 per cent, and in the next decade, 767 per cent.

In other words, while the cost of maintaining all other municipal departments was *increasing*, water property, because of the action of the Board of Supervisors in the matter of water rates, and because of that alone, was forced to suffer an absolute *decrease* in the percentage of return; and this notwithstanding the fact that San Francisco is the most difficult city in the world to furnish with water; that it requires nine distributing reservoirs in the heart of the city to maintain its fire pressure; that in order to maintain this fire pressure complainant allows no house or hydrant connections to be placed directly on the 30-inch or 24-inch pipe, and permits but few house connections on its 22-inch and 20-inch pipe (while fire hydrants have been set on special 8-inch side branches).

A recapitulation of Mr. Schussler's testimony, showing the *increase* in population, the *increase* in consumption of water, the *increase* in taxes, the *increase* in operating expenses, the *increase* in annual cost of school department, the *increase* in annual cost of the police department, the *increase* in the annual cost of the fire department, and the DECREASE in the price paid for water since 1880, is as follows:

7. EXPERTS' OPINIONS ON EXCELLENCE
OF COMPLAINANT'S WORKS, SHOW-
ING THAT DECREASE OF RATE
WAS UNWARRANTED BY
SERVICE.

While these other municipal functions were increas

States which is any better managed than this one."

6. RECAPITULATION

OF THE ABOVE VARIOUS PERCENTAGES OF INCREASE OF OTHER PUBLIC UTILITIES SINCE THE YEAR 1880.

(Testimony, Schussler, p. 1536.)

Year.	Population.	Percent of <i>Increase</i> over 1880.	Consumption of water.	Receipts from water sales.	<i>Increase</i> In taxes paid by S.V.W.Co.	<i>Increase</i> In operating expenses of S.V.W.Co.	<i>Increase</i> In annual cost of S. F. School Dept.	<i>Increase</i> In annual cost of S. F. Police Dept.	<i>Increase</i> In annual cost of S. F. Fire Dept.	<i>Decrease</i> In price paid for wa- ter below 1880
1880.....	234,000									
1890.....	300,000	28 per cent	61 per cent	18 per cent	133 per cent	28 per cent	30 per cent	26 per cent	55 per cent	27 per cent
1900.....	355,000	52 "	100 "	48 "	511 "	26 "	83 "	89 "	105 "	26 "
1903.....	410,000	75 "	149 "	59 "	767 "	54 "	76 "	101 "	171 "	36 "
					All increase.					This alone Decreases.

7. EXPERTS' OPINIONS ON EXCELLENCE
OF COMPLAINANT'S WORKS, SHOW-
ING THAT DECREASE OF RATE
WAS UNWARRANTED BY
SERVICE.

While these other municipal functions were increasing in cost, there was a *decrease* in the comparative price paid for water.

Yet no city can grow without water. Every man who handles a real estate proposition to change acreage property into town lots, must of necessity carry his water system as a part of his profit and loss account for a long time, unless he adds to the price of the lots then available for sale, sufficient to include the price of his water plant. No one element in the growth of San Francisco has been more important than its water system, about which the five greatest engineers of America have testified asserting the excellence of complainant's plant and the difficulty of the problem of how to furnish an adequate supply of water.

Mr. Hering testified: (p. 3435)

"I do not know of a water supply for any large city, in view of the difficulties under which the water is secured in San Francisco, which is more economically designed, better built and better managed than this one. Here you have the necessity of a complex system, and the difficulty of managing a complex system is much greater than managing a simple one, as for instance, merely pumping water from a river. Taking that into consideration I do not know of a system in the United States which is any better managed than this one."

Mr. Grunsky testified: (p. 316)

"The Spring Valley Works' system, to the extent of its capacity, ranks first in the reliability of service."

And at page 425:

"The constructed work of the Spring Valley Works is exceptionally good throughout."

And at page 354:

"The quality of workmanship on the works and structures of the Spring Valley Water Works is commendable throughout. Materials used are selected with care. Special care and extra cost has not been shunned in important cases to secure the best. This is notably the case in the pipe work and in the concrete and masonry structures."

Mr. Schuyler testified: (p. 5388)

"From my general examination of the works it is my opinion that they are exceedingly well designed, and that while there has been a very admirable class of workmanship in their construction, there has been no such extravagance as would give ground for a just criticism. It appears to me that in every structure which I have examined there is manifest absolute simplicity, and yet perfect adaptation to the purpose for which it is put."

At p. 5399:

"It is a well known fact, generally admitted, that the pipes of the Spring Valley Water Company, made of laminated iron, have actually lasted longer and been more durable by far than any other riveted pipes in existence made of the ordinary merchantable iron or steel."

And at page 5413:

"I consider the use of first-class materials and best workmanship always justifiable for any construction on

general principles, but it is particularly so in the construction of a water works plant, because so much depends upon the constancy and reliability of the service in the general prosperity and progress and advancement of the city, and this in turn is dependent upon the quality of the workmanship and the large factor of safety given to all the works by such materials and workmanship as a preventative against breaks and interruption of the service."

And at page 5434:

"My opinion of the entire system as a whole, as I have examined it and described it in detail, is that it is most admirably adapted to the present and future necessities of a water supply for the city and county of San Francisco."

Mr. Stearns, the Boston expert, testified: (p. 4255)

"I have been very much impressed with the excellent engineering displayed in the design and construction of the works, and particularly with the skill displayed in utilizing so large a quantity of ground water from the Alameda district. I regard the system as efficient and economical and including a wise provision for future use. . . . I should say that, taking into account the difference in local conditions, the water system of San Francisco would take a very high rank among the water supplies of large municipalities."

Mr. Adams, the Oakland expert, testified: (p. 4707)

"I am of the opinion that the entire scheme as the Company has outlined it and has acquired properties for the supply of the city and its inhabitants with water, is exceptionally well suited for its purpose, that it embodies all of the desirable qualities which you have enumerated in an exceptional degree as compared with systems of water works elsewhere, and that unusual foresight and good judgment have been used in selecting and developing the most promising sources of water supply that the country affords."

And again: (p. 4740)

"The general conception and gradual development of the plant has been carefully worked out, and the structural features are intelligently designed and far more carefully and substantially constructed than is generally the case elsewhere. The works, as a whole, reflect much credit upon their designer and builder."

Surely such a water system with the excellencies above quoted, surmounting difficulties greater than in any other large American city, should give no honest cause to a municipal board to decrease its rates and decrease the value of its plant, while other public utilities operated by the city were being increased because of the difficulties incident to the city's growth.

V. PRELIMINARY ANALYSIS OF RETURN.

1. IN GENERAL.
2. NET RETURNS 1903, 1904, 1905. TABLE SHOWING PERCENTAGES OF NET RETURNS BASED ON VALUATION OF ENGINEERS.
3. DEPRECIATION AS AFFECTING NET RETURNS. TABLE SHOWING INTEREST RATE IN COST WITHOUT ALLOWANCE FOR DEPRECIATION TO AVERAGE ONLY FOUR PER CENT TO COMPLAINANT SINCE NEW CONSTITUTION.
4. VALUATIONS GRADUATED TO THE RATE OF INTEREST TO BE ALLOWED AS A SUBSEQUENT COMPENSATORY FACTOR.
5. PROPER INTEREST RATES; INCLUDING TABLE SHOWING ANNUAL RETURN BASED ON GRADUATED RATES.

I. IN GENERAL.

While it may not be quite logical to give the values themselves prior to the discussion of the physical properties, yet in this case, as there is such a mass of evidence that examination in detail must of necessity carry with it distractions from the train of thought pending the time that sufficient knowledge of what the evidence actually is has been obtained, we will here, somewhat out of order, give the court a short résumé of the valuations graduated to the several rates of interest referred to by the witnesses in the case.

The court, of course, being entirely familiar with the facts found in the decision of the temporary injunction herein, will be able to follow us more easily than it would had the case not been taken up before.

After we have given these facts, we will subsequently in the brief discuss the valuations as given by the experts themselves; but we insert this system of valuation at the present time so as to explain to the court the percentage returns from the several view points.

In this way we hope to assist the Court in realizing the reason for reference to testimony concerning the several pieces of property and elements of value.

Then after we have shown these physical problems, and the Court is familiar with our ideas of the questions involved, we will return to a full and complete discussion of values.

2. NET RETURNS IN 1903, 1904 AND 1905 (INCLUDING TABLE SHOWING PERCENTAGE RETURN ON ENGINEERS' VALUES).

Mr. Booker, the chief clerk and statistician of complainant testified, and it is not challenged, that based upon the ordinance of 1902, complainant received from water rates in fiscal year 1903-4, \$2,072,379.00 (p. 5833); that the amount which would have been collected under the ordinance of 1903-4 would have been \$1,943,941.06 (p. 5834); that the amount which was collected from July 1, 1904, to June 30, 1905, based upon the rate fixed by the 1902 ordinance, was \$2,131,323.98; and that the amount which would have been collected under the ordinance passed for 1904-5 would have been \$1,996,496.59. At the time he testified (December, 1905) he estimated the amount which would be collected in the year 1905-6 based on the 1902 ordinance, at \$2,243,000, and that the amount which would have been collected if the ordinance of 1905-6 had been followed would have been \$2,110,200. (p. 5835). He also testified (p. 5835) that there were 4192 hydrants in 1905, and the city paid therefor in the month of November, 1905, \$4,060.66, which was less than one dollar a hydrant.

Mr. Schussler has shown in his testimony that the maintenance of complainant's hydrants under fire pressure, has been the means of saving the city of San Francisco vast sums of money in insurance. He testified: (p. 1521)

"The fact of the building being on a street and in a district which is thoroughly protected against fire because

of the presence of water mains and hydrants, thus receiving a reduction in its insurance rates as against a similar building that is in an entirely unprotected district—for instance the insurance rate that, for a three year insurance, would be on a building in an entirely unprotected district, about 60 cents for each \$100—in a fully protected district containing good-sized water pipes and hydrants in the street, or in the immediate region in which the house is located, the insurance rate would be at 40 cents per annum. . . . This shows that the householder, because of the presence of water mains and hydrants, is benefited in the neighborhood of 20 cents per annum on every \$100.00 insured. The average one-story house and contents, if valued at \$2400.00 and insured at \$1800.00, would benefit, by this reduction in the insurance rate, about \$3.60 per annum, or 30 cents per month, which saving, owing to the presence of water mains and hydrants in the street or in the region where the house is located, should properly be credited to the monthly rate the householder pays for water, to-wit, from \$1.37 to \$1.40. So that if the rate in round figures, is called \$1.40 a month, deducting from this the 30 cents benefit that he would receive on account of a reduced fire insurance rate, the price that is actually paid for water would be only the difference, namely, only \$1.10 per month.”

And he estimates that in December, 1903, amongst many other advantages, the population was benefited because of water connections, by a reduction in the fire insurance rate alone of nearly 25 per cent. (p. 1525.)

This entire discussion appears between pages 1520 and 1526 and is here referred to.

During the fiscal year 1903-4, as is shown by Exhibit 124, the operating expenses between July 1, 1903, and June 30, 1904, were \$566,786.97, and the taxes were \$325,287.66. (Reynolds, p. 5808)

Consequently, had the preliminary injunction and restraining order not issued in the present action, the gross returns of complainant for 1903-4 would have been (p. 5834).....\$1,943,941.06

Fixed expenses were (p. 5808)

Operating expenses\$566,786.97

Taxes 325,287.66 \$892,074.63

Leaving net\$1,051,866.43

To obtain the actual net return we must deduct from this last balance the depreciation on the structural properties. Mr. Schuyler (p. 5473) estimates this as a minimum at a figure of 1 per cent annually on the value of structural properties.

To obtain the cost of structural properties, we take Mr. Schussler's figures, viz:

Total cost of construction of the Spring Valley Water Company, including rights-of-way, value of Merced property, city property, and properties at Belmont and Millbrae pumping plants (p. 1516)\$26,500,000

Deduct therefrom the value of real estate including Merced and rights-of-way and city properties as given by Mr. Schussler (pp. 1511-1512)\$6,694,000

And we have the value of the structural properties liable to depreciation.....\$19,806,000

In other words depreciation is at a minimum.\$198,060*

* This is practically the same amount as \$196,000, obtained by taking two per cent of the cost of the perishable portion of the physical properties (\$9,800,000), referred to in our opening brief as the proper allowance for depreciation.

ANALYSIS OF FIGURES.

The estimated total receipts under 1903 Ordinance, which would have been the total receipts if complainant had not obtained the temporary restraining order in this action, are \$1,943,941.06.

NET RETURN.

The net return will depend upon the deductions allowed by the Court as proper. All courts agree that operating expenses (\$566,786.97) and taxes (\$325,287.66) should be allowed. It is the universal trend of modern decisions that in addition thereto, an annual depreciation which takes the place of a sinking fund (a charge usual to operating plants, for the purpose of allowing for deterioration of structural properties) should be allowed, ranging from one to five per cent. As indicated above, we have estimated it at the lowest to be safe within the limit of fairness, to wit, at one per cent, for this preliminary estimate (\$198,060).

The current practice is also to deduct from the gross receipts the interest paid on bonds and floating debt (\$724,773.73). Of course, if interest is deducted, then the valuation is based upon the equity of the values of the property after deducting the amount of the outstanding bond issue, on which the interest is paid from the gross valuation.

At pages 4880 and 4881 the expert accountant, Mr. Reynolds, gave the amount of interest paid out from January 1, 1903, to December 31, 1904, as follows:

For year ending December 31, 1903:

Interest (floating debt)	\$ 60,928 40
Coupon interest (bonded debt)	658,500 00

For the year ending December 31, 1904:

Interest (floating debt)	\$ 34,113 07
Coupon interest (bonded debt)	696,006 00

As the fiscal year ending July 1, 1904, was one-half of both these years, we have taken as the interest account for that fiscal year one-half of the interest paid during the twenty-four months commencing January 1, 1903, to December 31, 1904, making \$724,773.73. Consequently, we have:

NET RETURNS IN FISCAL YEAR 1903-04.

1. On basis of allowance of operating expenses and taxes.....\$1,051,866 43
2. On basis of allowance of operating expenses, taxes and depreciation.. 853,806 43
3. On basis of allowance of operating expenses, taxes, and interest on bonds and floating debt..... 327,092 70
4. On basis of allowance of operating expenses, taxes, interest on bonds, floating debt, and depreciation... 129,032 70

Now, using each one of these figures of Net Return as a basis of computing, the percentage which would be allowed to the complainant on the valuation of properties used and useful, respectively, we have the following table:

In other words, *based on the Board of Supervisors' figures and not allowing for depreciation, the net return (which is gross for purposes of dividends) under*

TABLE SHOWING PERCENTAGE OF NET RETURN BASED ON ENGINEERS' VALUES.

To complainant on valuation of property used and useful on basis of various estimates of engineers, accountants, and Board of Supervisors, in 1903, (after net return has been figured by deducting from gross returns (a) third column, operating expenses and taxes; (b) fourth column, operating expenses, taxes and depreciation; (c) fifth column, operating expenses, taxes and interest; (d) sixth column, operating expenses, taxes, interest and depreciation). In figuring percentage on these two latter bases, the equity of the reasonable valuations remaining after deducting the bond issue is used as the valuation of property.

Source of Valuation.	Amount of valuation.	(a)	(b)	(c)	(d)
		Percentage based on net return after allowance of operating expenses and taxes only, to-wit, \$1,051,866.43.	Percentage based on net returns after allowance of operating expenses, taxes, and depreciation, to-wit, \$853,806.43.	Percentage based on net returns after allowance of operating expenses, taxes, and interest, but not depreciation, to-wit, \$327,092.70. (Valuation here used after deducting bond issue, to-wit, \$13,750,000.)	Percentage based on net returns after allowance of operating expenses, taxes, depreciation and interest, to-wit, \$129,032.70. (Valuation here used after deducting bond issue of \$13,750,000.)
Stearns	\$70,000,000	1 50/100 per cent	1 22/100 per cent	58/100 of 1 per cent	23/100 of 1 per cent
Schussler	51,500,000	2 04/100 "	1 66/100 "	87/100 " 1 "	34/100 " 1 "
Hering, Schuyler, Adams and Accountant Reynolds	45,000,000	2 34/100 "	1 90/100 "	1 5/100 per cent	41/100 " 1 "
Grunsky (modified as to Alameda property. See hereinafter)	31,600,000	3 35/100 "	2 70/100 "	1 83/100 "	72/100 " 1 "
Board of Supervisors in 1903....	24,124,389	4 36/100 "	3 54/100 "	3 15/100 "	1 24/100 per cent

In other words, *based on the Board of Supervisors' figures and not allowing for depreciation, the net return (which is gross for purposes of dividends) under the 1903 ordinance*, was 4.36 per cent. Even taking the figures of the Board of Supervisors, which omit many of the elements of value of property, and omitting from the amount to be deducted the elements of depreciation, with taxes and operating expenses, complainant would receive less than is the current rate from a fully protected real estate mortgage investment; and this investment was originally, and is now, fraught with the greatest commercial risk. From 1858 to 1865 the projectors of this enterprise did not know that water could not be gained from nearer sources; they did not know but that their own watershed might prove to be occasionally barren and subject to droughts; they did not know that San Francisco was to have a permanent population; they did not know that California was to have a permanent growth after the gold fever died out; they did not know but that Oakland or Sacramento or Los Angeles might become the metropolis; they did know that other people lending money were getting $2\frac{1}{2}$ per cent per month to $1\frac{1}{2}$ per cent per month for their money invested; they did know that people investing in the center of San Francisco would get an unearned increment due to metropolitan surroundings; and yet they took this risk, and certainly such a beggarly return as 4.36 per cent would not be reasonable or fair, and that rate allows nothing for depreciation.

3. DEPRECIATION AS AFFECTING NET RETURNS.

The Federal Interstate Commerce Commission in fixing the rates for railroads allows an annual charge for depreciation. Boards having similar functions in England also allow such annual charges.

We will show hereinafter that each of the expert engineers has testified that, in his opinion, for water rates to be equitable such a charge must be allowed complainant.

This depreciation must be considered as a comprehensive term, and identified from the petty depreciation of individual parts capable of being replaced.

As defined by them, depreciation includes not only deterioration of structures capable of replacement, such as pipes, flumes, meters and the like, by use, but also deterioration of dams and other structures not capable of replacement, except as a whole; change in methods of machinery, due to increase in engineering skill, temporary abandonment of one source of water because another source has become more valuable, due to the fact that the city has grown in that direction, and the like. It also includes an element similar to a sinking fund against the possibility of structures being damaged by earthquakes, cloudbursts or other accident. When such large elements of depreciation are to come into active knowledge can only be determined in advance by the law of averages. To charge the replacement of any large structure, abandoned or put out of service for any reason, to the particular year of its abandonment, would work a hardship to the rate-payers

for that particular year. An annual allowance for deterioration is the only equitable method for all concerned when attempting to value property for rate-fixing purposes.

So much of depreciation as is created by the use of the plant, capable of being met by current repair-expense can be eliminated from the discussion and still a large element remains to be provided for in some way.

The testimony of the several experts on this subject was as follows:

Mr. Adams testified: (p. 4908)

"Everything of a perishable character is subject to gradual deterioration; for instance, pipe lines deteriorate, many classes of buildings deteriorate, pumping machinery eventually passes out of use for one reason or another; sometimes it is because it is of a type no longer economical for use in comparison with better machinery; and sometimes water supplies themselves, by reason of increase of population, become unfitted for use and have to be abandoned; then again, it may be that, under certain circumstances, whole structures have to be abandoned outright. All of these things go to make up depreciation.

"X. Q. 166. Suppose it is true that wherever perishable parts of water works have become useless they have been replaced and the cost of the replacement charged to operating expenses; in other words, paid out of the income from the rates, at the same time the stock paying a dividend and all other expenses being paid, would you say that that would alter the problem at all?

"A. Yes, it may materially alter the situation. If the revenues have been made adequate to pay proper returns upon the value of the property, in addition, of course, to all the various items of expense in the conduct of the plant, and, in addition, admit of the renewal of

structures which have perished, it is evident that, under those circumstances, there is no occasion for considering the matter of depreciation at all. The structures which are gone have been paid for as they should be paid for, out of the revenue of the company, that is, out of the earnings of the company; and the new structure having taken its place and been paid for in that way, is not charged up to new construction at all, but renewal has gone to expense, where it belongs, leaving the plant substantially where it was. So that if the account is properly kept there is no reason even then why depreciation should figure at all in the determination of value.

"X. Q. 167. Would you say that old water works, other things being equal, would be of the same value as brand new ones built at the present time?

"A. The answer to that question again depends upon the purpose for which value is determined. If the value is determined for rate-fixing, and it has been the policy of the rate-fixing authorities to make no allowance for depreciation, or, if making any allowance at all, simply making it from year to year as a contribution to a fund to be used for the purpose of renewals or as the repayment from year to year of the investment in structures which have actually passed out of use during the preceding year, then we may say that the value of an old plant, if you choose to so call it, that is, a plant in actual use, is worth just as much for rate-fixing purposes as a brand new plant would be. This is also justified by the further thought that the water which is delivered to the consumer through a pipe which has been in use for some years is just as good and just as effective for his purposes, or even more so perhaps, than water which is delivered to him through an entirely new pipe; in other words, the service rendered to the consumer is just as valuable delivered through a system that has been in use for a number of years, so long as the system is maintained in a proper condition, as if it were delivered to him through a brand new system."

Mr. Adams conclusively shows that complainant had not been allowed anything for depreciation by means of dividends. He testified, with reference to the total cost and the interest rate on cost, without allowance for depreciation, as follows:

"Starting with December 31, 1879, at which time, according to the before referred to exhibit before the Board of Supervisors, the Company's investment amounted to \$18,840,202. To this amount, I have added each year the money spent for new construction, according to the annual statements filed by the Company with the Board of Supervisors, down to and inclusive of the year 1899, beyond which point I did not prosecute the inquiry. I have, also, from the said annual statements, ascertained the amount paid in dividends and interest and ascertained for each year the per centum which this represents of the total investment. This information I have compiled in the form of a table, a copy of which I now hand you. The table shows that the greatest rate of interest represented by the dividends and interest paid in any year amounted to 4.8 per cent. The least amounted to 2.4 per cent and the average was almost exactly 4 per cent." (p. 5294.)

The document referred to is as follows:

DETERMINATION OF THE RATE OF INTEREST UPON THE
COST OF THE PROPERTY REPRESENTED BY THE
MONEY PAID FOR INTEREST AND DIVIDENDS BY
THE SPRING VALLEY WATER COMPANY.

Cost of property to December 31, 1879, according to Exhibit before Board of Supervisors	\$13,168,693 00
Interest loss from lack of revenue.....	5,671,509 00
Total	<u>\$18,840,202 00</u>

TABLE SHOWING INTEREST RATE ON COST WITHOUT ALLOWANCE FOR DEPRECIATION TO AVERAGE ONLY FOUR PER CENT NET SINCE THE NEW CONSTITUTION.

				Interest rate on cost without allowance for depreciation.
	Additions to plant.	Total cost.	Dividends and Interest paid.	
Dec. 31, 1879.....	.....	\$18,840,202	.....	.....
1880.....	\$ 62,628	18,902,830	\$ 907,557	4.8 per cent
1881.....	72,148	18,974,978	883,915	4.6 "
1882.....	51,688	19,026,666	889,021	4.7 "
1883.....	1,050,086	20,076,752	486,033	2.4 "
1884.....	932,464	21,009,216	667,740	3.2 "
1885.....	881,406	21,890,622	857,254	3.9 "
1886.....	652,575	22,543,197	899,878	4.0 "
1887.....	1,257,982	23,801,179	920,088	3.9 "
1888.....	2,723,251	26,524,430	1,043,258	3.9 "
1889.....	388,216	26,912,646	849,267	3.1 "
1890.....	637,454	27,550,100	1,227,236	4.5 "
1891.....	683,197	28,233,297	1,169,949	4.1 "
1892.....	235,337	28,468,634	1,189,340	4.2 "
1893.....	327,342	28,795,976	1,206,131	4.2 "
1894.....	367,782	29,163,758	1,230,183	4.2 "
1895.....	485,910	29,649,668	1,244,738	4.2 "
1896.....	432,378	30,082,046	1,219,323	4.0 "
1897.....	727,957	30,810,003	1,310,405	4.3 "
1898.....	1,174,973	31,984,976	1,305,129	4.1 "
1899.....	708,430	32,693,406	1,296,282	4.0 "
Average.....				4.0 "

(Page 5295, Adams' testimony.)

Mr. Schuyler testified: (pp. 5472-3)

"X. Q. 51. Supposing, in any one year, the sales of water paid all the expenses of the company, including its operating expenses, the interest upon its bonds or floating indebtedness, and its taxes, and, in addition thereto, paid out in dividends to the stockholders a certain sum which, added to a certain other sum put into the works for permanent investment, would amount to the current rates of interest upon the capital actually invested during that year; under such circumstances do you think anything should be added to the element of going business for that year?"

"A. Except for the omission of another item, the fund for maintenance and depreciation for keeping up the works to a standard of efficiency and excellence; that is a consideration to which the company is constantly entitled and should always have added to the other items of income mentioned—for dividends or for interest on the capital, and operating expenses; if that in any one year were paid, as well as the interest on the bonded indebtedness, all the operating expenses, taxes, etc., there would be no necessity in that one year of adding anything for the value of the going business because there would have been during that year none of the losses which constitute that going business.

"X. Q. 52. How much for depreciation?

"A. I think that the probable average value of depreciation on a water works plant of this character is about one per cent.

"X. Q. 53. On what?

"A. On its cost."

Also (p. 5475) :

"A certain amount should be always set aside for the depreciation account for maintaining the works in serviceability, and that the company is as much entitled to that as to interest upon its bonds and its operating expenses of the ordinary character.

"X. Q. 66. What I am trying to get at, Mr. Schuyler, is if that is so, you get at a definite amount, or a definite portion of the element "going business," by taking into consideration depreciation; why should you not deduct depreciation when you come to make an estimate of the value of the actual properties?

"A. Because depreciation having supposedly been provided for in the revenues, no actual depreciation exists; the serviceability of the plant having been maintained no actual depreciation could be deducted. . . . The works are devoted to a public service and they cannot be sold, or realized upon in any other way, and the company is bound to maintain the works in service-

able condition, and therefore, the element of depreciation cannot reasonably be considered as against the value of the property because they are entitled to have that property maintained without such depreciation being manifest or being considered."

Mr. Stearns testified: (p. 4291)

"X. Q. 72. Is it generally true that municipally owned works count as a cost a sum for a sinking fund?

"A. I think they are required to in Massachusetts. . . . It is paying a sinking fund, but in a large number of cases, particularly in the Metropolitan District, it has not bought its works by the time they are given up, that is, works have been abandoned long before the sinking fund has paid for their cost, in a good many instances."

Also (at pp. 4415-8):

"X. Q. 809. What in your opinion are the duties of the municipality to the corporation in the matter of rates?

"A. It ought to pay a sufficient water rate, or a sufficient annual sum in some way, so that the company should be properly recompensed for its expenditures. That sum should be materially larger where there are risks than where there are no risks involved, or, somewhat in proportion to the amount of risk. They also should pay, I believe, a sufficient sum to take care of the depreciation in value of the works, either from deterioration or from their becoming not as well adapted to the supply of the city in the future, so that when works have to be abandoned they will be paid for.

"X. Q. 812. Supposing it should be true that through a long period of years that had taken place, then it would be true, would it not, that if the corporation was allowed to charge for a renewal—by renewal in this sense I mean renewals of such portions as deteriorated from time to time—I say if they should charge

that and receive it in the form of operating expenses and maintenance, and then should be allowed a certain percentage upon the value of its works for depreciation besides, it would then be true that the company was getting money for depreciation twice, would it not?

"A. I think it would if that system were followed throughout a long term of years, but what is done at any given time gives no assurance, as I understand, under any law or under any contract that the same action will be taken in the future. It is, as I understand, at the will of the governing body of the city of San Francisco, or of the court, that these various sums are allowed. To make myself clear I think I would take an instance: Supposing there were new works which required no renewals for 30 years, and there was no contract by which it was agreed that those parts of the works would be renewed at the end of 30 years, that would be a very unsafe basis, it seems to me, to float bonds upon if the works were of such character that they were going to become worn out in 30 years.

"X. Q. 813. Supposing that the corporation voluntarily makes the charge for renewals in its charge for operating expenses, then do you think it should be entitled to a certain sum in addition for depreciation; for instance, supposing that this corporation has been doing that for 40 years, that it has been charging every new pipe that has been put in in place of an old one to operating expense, and supposing that, during all that time, it had been allowed $2\frac{1}{2}\%$ upon the cost of those properties that are subject to deterioration, it would be true that it received all the money twice, would it not?

"A. It is obvious that if both those things were done then the company might get more than its principal sum, but what has been done and is done is no assurance of what will be done subsequently, and therefore, it seems to me that the depreciation charge paid every year is the proper way to fix the matter. . . .

(A. to X. Q. 816.) I think, beginning in any year, it would be desirable to change that policy and pay a depreciation or sinking fund, or whatever it may be

termed, and make the corporation keep a definite account and report it each year, of the sums expended from that depreciation fund, and the amount still left in it, and, as nearly as may be, make that depreciation fund cover the probable depreciation in the value of the works.

"X. Q. 817. What works of the Spring Valley Water Company are subject to depreciation, in your opinion?

"A. The flumes certainly require renewal in time; also the pumping station, or, at least, the pumping machinery; the iron pipes, more particularly the wrought-iron pipes, and there is liable to be, as the consumption of water increases to a large extent due to the change of plan the inadaptability of certain of the works to future conditions.

Mr. Stearns also testified concerning property which might go out of use and could only be taken care of by the depreciation account, as follows: (p. 4253)

"It may be for the interests of both the city and the company in many cases that works of a temporary character, or which are not wholly permanent, should be built instead of permanent works. Under such circumstances where it is for the interests of all parties that such works be built they ought to be included in the valuation until the company receives, through the annual payments, or otherwise, a proper compensation for them. This view may best be explained by some examples: For instance, suppose the question were to arise at the present time, in connection with the increase of the water supply of building the Calaveras dam, and a pipe leading from it to the easterly side of the bay, or of the building, if it were feasible, some temporary works on the eastern side of the bay, for obtaining water from the ground, assuming as a hypothetical case that the Calaveras dam, and a pipe leading from it would cost \$4,000,000, and that the temporary ground water supply would cost \$300,000, with an expense for maintenance in excess of the cost of maintaining the Calaveras

dam and pipes of \$40,000 a year, and that the temporary works would supply enough water to defer the building of the dam and pipe for five years, and then be abandoned. In the case of the building of the dam and pipe the cost for the five years, reckoning interest at only 5%, would be \$1,000,000, while the cost of the temporary pumping station and works, and for their maintenance for the five years, assuming that the works became valueless at the end of the time, would be but \$500,000. In this case there would be a gain of \$500,000 in the five years even though the temporary works remained as a part of the property to be valued until the compensation received was equivalent to their full cost, that is, for 50 or 60 or more years. As a second example, take the comparison of two methods of conveying water, one the building of a flume which may last say 25 years, the flume being built along the side of a hill, and the alternative plan of constructing through the hill a lined tunnel; the flume would cost say one-fourth as much as the tunnel, and, therefore, would amount in the valuation upon which the water rates are based to only one-fourth of the sum. In this case, as in the case of temporary works, it is for the interest of the city that the flume should be built, but it is not for the interest of the company unless the flume continues to be valued until it has been paid for, otherwise the company does not receive just compensation for its temporary and perishable works if they ceased to be valued as soon as they are out of use."

Again (at pp. 4514-5) :

"X. Q. 1230. You state on your direct examination, referring to properties that are no longer in use, that they ought to be included in the valuation until the company receives, through the annual payments or otherwise, a proper compensation for them. What do you consider is a proper compensation?"

"A. It is the principal expended and a fair rate of interest.

. "

"X. Q. 1234. Your theory would be that where a property had been acquired by a company and had actually gone out of use, and there was no guarantee at the time it was acquired that the company would get all of its money back, there should be included in the valuation upon which the rates are fixed, until the principal was repaid and interest upon the actual value of the property and not its cost; is that your theory correctly stated?

"A. I think so, but I have not included that in my general rules for valuing property. I merely have laid that down as a rule, that that would be proper if it could be so arranged.

"X. Q. 1235. Under that rule at what period would you take the value of the properties which had gone out of use in estimating the amount of interest? I understood you to say you would reckon the interest upon the present value; to what time do you refer by the word 'present'?

"A. I think that is outside of the general rules that I have laid down because, in a sense, there would be no present value of a work that had gone out of use; it was rather as indicating a policy that I thought would be proper, and for the interest of both the city and the company, so that the company would be induced to build temporary works when it was manifestly economy to do so. That would necessitate, I believe, some distinct policy such as would be fixed by a contract or fixed in some definite way. I had no idea that works that had gone out of use would be valued in the present case.

Again (p. 4531):

"R. D. Q. 29. In the matter of depreciation, how far is it to be taken into consideration in this matter of fixing rates? That is a mere matter of repetition but I would like to have it answered by itself.

"A. I think the answer to that question is associated with the question whether there is a contract or a guarantee or whether a sinking fund is paid. As I understand the matter the replacing of flumes and similar works is

done at the expense of the company and not included in the annual charge. I use flumes only as one example of the many perishable works. Under such circumstances it seems to me that no depreciation should be allowed on such flumes during their life and while they are in service. Taking the depreciation as a whole there is obviously some depreciation due to the inadaptability of certain works to do the full service that might be done by works designed at the present day, and that depreciation I should say, should be allowed."

Mr. Hering testified: (p. 3897)

"In the case of a sale the buyer takes over the whole plant in the condition in which it is found and assumes all responsibility for the future. It is, therefore, fair and proper that if the plant is depreciated the buyer should not pay the price of original cost, but one which is fair, considering the condition of the works on the date of sale. The buyer then assumes the responsibility for repairs and for a replacement of the works which are partly worn out at whatever date they will be worn out. The case is different if the question pertains to the fixing of rates, provided that the owner assumes the responsibility of keeping the works in permanent repair, in permanent usefulness, so that they can comply with the contract. In the case of a water company I would say, so long as the company can furnish water of the proper quality and quantity, and assumes the responsibility of maintaining the works in condition to do this, then the works should be valued at the value of construction. To use a simile which I have heard applied to such a case I will say that, in the case of a street-car company, when the cars have somewhat depreciated and the horses have somewhat depreciated in age and usefulness, or the machinery by which the electricity is made, or cables are drawn, is depreciated, there is no reduction in the fare charged to ride upon the cars, the company assuming the responsibility for carrying the passengers properly, according to the contract, but the company must then, if it is a company, keep the works

so that they can adhere to the terms of their contract or franchise, as the case may be.

"I think it is fair to allow them an income on the sum which represents the value of the works on the day of sale, that value to be such a one which is equivalent to complete works in complete order, in a state of complete usefulness.

"X. Q. 2602. And you consider that is a fair measure of their value today, although they are not new?

"A. For the purpose which you have yourself stated on several occasions—for the purpose of rate-fixing, because that is the equivalent. If it was a question of sale I should, most assuredly, deduct for depreciation on all of the works that would so require it. Of course a tunnel would not depreciate in value, but most of the work does, even the excavation which is made to lay a new pipe in; it depreciates with the pipe, that is to say, the value of the first excavation has disappeared completely when the pipe is worn out because you have to make a new excavation to lay the new pipe. Rock excavation in that sense does not depreciate because that need not have to be done over again. . . . An earth dam, if well built, depreciates very little. We have estimated sometimes nothing and sometimes a life of 100 years merely to put down a figure, but that is equivalent almost to perpetuity."

Mr. Grunsky testified: (p. 179)

"As the company should be allowed a reasonable return upon its investment, depreciation resulting from deterioration of the plant, or from other causes, should be taken into account in some way. It may be taken into account by estimating reduction in value of the perishable portions of the plant, and paying to the company annually the sum of money representing this depreciation. In this case the annual depreciation allowance is a repayment to the company of capital invested, and in succeeding years the valuation of the works should

be correspondingly reduced. Depreciation may, however, be fully covered by assuming the works to remain at their full value so long as they render efficient service, and applying the interest rate to such valuation, which will, as a matter of fact, be in excess of value as determined under the other system."

And (at page 422) :

"X. Q. 556. Do you believe it is proper to add any percentage in view of the uncertainty of adequate returns and the risks and responsibilities assumed by the Spring Valley Water Works in establishing and maintaining its works?

"A. I do in this sense, that some of the properties depreciate in value by going out of use, and that ought to be taken into account.

"X. Q. 557. Was that taken into account in any of these allowances that were made?

"A. It should be taken into account in fixing the interest rate that is paid.

"X. Q. 558. What is your idea in regard to that, that there should be a larger rate of interest than the current rate?

"A. That there should be a larger rate than the interest rate on what would be called safe investments."

On this subject the New Jersey court has said :

"Summarized, these elemental principles are the right of the company to derive a fair income, based upon the fair value of the property at the time it is being used for the public, taking into account the cost of the maintenance or depreciation and current operating expenses and the right of the public to have no more exacted than the services in themselves are worth."

Long Branch Com. v. Tintern Manor Water Co., 62 Atl. Rep. 474-478.

Elements of depreciation are also recognized in:

Milwaukee v. Milwaukee, 87 Fed. 577, at p. 583;

San Diego Land Co. v. National City, 74 Fed. p. 81;

Wilkesbarre v. Spring Brook Water Supply, 4 Lack. Leg. News, 367.

Beale & Wyman, on Railroad Rate Regulations, say:

"In general an annual charge for depreciation in value of the plant by use seems proper. * * * The equipment of the road must be renewed from time to time; and an expenditure of the proper proportionate amount in each year for new equipment is a proper annual charge." * * *

Sections 430-431, and a large number of cases there collated.

4. VALUATIONS GRADUATED TO THE RATE OF INTEREST TO BE ALLOWED AS A SUBSEQUENT COMPENSATORY FACTOR.

In order to arrive at a conclusion as to the reasonableness or unreasonableness of the ordinance it is necessary to determine two factors: First, what is the proper return to the corporation on property used and useful in supplying water to the city of San Francisco and its inhabitants; second, what is the amount that the ordinance in question would produce.

If these two reasonably approach each other, that is to say, if the amount produced by this ordinance equals a fair and just return on the value of complainant's

property used and useful in furnishing water, over and above fixed charges (operating expenses, taxes, interest, and depreciation), the judgment must be for the defendants; if these two factors are widely divergent and the second factor unreasonably low, the judgment must be for the complainant.

In determining the first fact it must be established: first, what is the reasonable fair valuation of the properties used and useful by complainant; second, what is a fair rate of return on that valuation.

The complainant has produced as witnesses the noted hydraulic engineer Mr. Rudolph Hering, the greatest living expert on water property values, who has been employed in valuations of water properties by over one hundred cities; Mr. Frederick Stearns, another hydraulic engineer of renown, the expert of Boston, Massachusetts, who is chief engineer of the Metropolitan Water System, which acts as a wholesaler to furnish water for Boston and twenty contiguous towns; Mr. James D. Schuyler, hydraulic engineering expert of Los Angeles, who occupies towards the Pacific Coast the same position that Mr. Hering does to the Atlantic Coast and has been the expert for over fifty cities; Mr. Arthur L. Adams, who is the chief engineer of the Oakland water system and thoroughly familiar with the local situation about San Francisco Bay from experience, and has been the expert for many other cities; Mr. Hermann Schussler, who has been chief engineer for the complainant for forty years and who has produced a system which is pronounced by all engineers to be the most complete of its kind, and which is com-

mented upon by the chief expert of defendants, Mr. C. E. Grunsky, as follows:

“The needs of the city have been fully met in the past; so that the service rendered in the past is ample evidence of the capacity of the works to yield water.”
(Grunsky, p. 335.)

The values placed upon these properties by all of the complainant's experts and by Mr. Grunsky, the chief expert of defendants, have (with the exception of Mr. Grunsky's valuations of Alameda properties as hereinafter explained) been practically on the same basis. But these vary because of the point of view taken by each of the experts and of the various elements of safety used in determining whether certain properties were actually in use at the present time or not, and whether certain tangible properties should be considered as being in use at the present time or not and whether certain intangible properties were properly to be considered. The particular points of view of each of the experts will be shown hereinafter, but to make the first analysis to the Court approaching this complicated problem comprehensive, the figures from the several points of view of these various experts are as follows:

By Mr. Stearns, \$70,000,000 (p. 4261); by Mr. Hering, \$45,000,000 (p. 3472) (with a maximum value of \$55,000,000, p. 3474); by Mr. Schussler, \$51,500,000 (p. 1586); by Mr. Adams, \$45,000,000 (p. 4769) for rate-fixing purposes (\$50,000,000 being his value of a substitutional system) (p. 4767); by Mr. Schuyler, \$46,000,000 or in that neighborhood (p. 5452) (\$55,000,000 being his valuation based on a substitutional

system) (p. 5451) ; by Mr. Grunsky, \$28,024,389 (p. 175). In Mr. Grunsky's own figures (Grunsky's testimony, p. 171), there is the item of franchise, \$2,500,000 (for which complainant is taxed at the rate of \$5,330,000, Municipal Reports 1903, p. 500), and value of going business at \$1,400,000. These last two items were omitted by the board of supervisors when they estimated the amount to be obtained from a water ordinance, as improper elements of value (Grunsky's testimony, p. 347). The latter element of value, as a going concern, was increased by Mr. Grunsky in the 1904 estimate, to \$1,500,000 (p. 423), which again was omitted by the supervisors in estimating value for that fiscal year.

In Mr. Grunsky's 1903 valuation he placed a value on the Alameda Creek system of \$4,554,483 (p. 175), basing his valuation on primal cost only (X Q 96, p. 344) because he had doubts as to the serviceability of the filter bed, that is, its "permanent serviceability." (X Q 90, p. 343.) At page 185 (Gr., p. 336) of his report made to the board of supervisors he said: "Concerning the aggregate annual yield of water claimed for the gravel beds in Sunol Valley, it is too early in the history of the source of supply to accept any conclusion as final. These works were put into service last September and have yet to make their record of actual delivery"; and again he testified:

"X. Q. 90. Do you maintain that at the present time there is any doubt as to the permanent serviceability of the natural filter?

"A. I do." (Test. p. 343.)

Now, while the record in this case does not show the fact past 1903, this permanent serviceability is to-day firmly established (see also record in 1907 case). We have a right, therefore, to argue on the value which Mr. Grunsky would have given it had he disabused his mind of the fear of its permanent serviceability, and which was testified as being permanent by all of complainant's experts and not doubted by any of defendant's experts, except Mr. Grunsky. He undoubtedly would have used the same methods of valuation on the Alameda Creek properties as he did on the peninsula properties. The peninsula properties he valued at \$9,945,458. (P. 175.) The Alameda properties have continuously since 1902, when the filter tunnel was completed, produced over 14,000,000 gallons per day average, and they are now (1905) relied upon for 15,000,000 gallons per day average. (Schussler, p. 217.) In 1903 complainant took daily 16,000,000 gallons from the Alameda system. (Schussler, p. 180.) The peninsula system has produced 17,000,000 gallons per day.

Consequently the Alameda system, as a water producer, is at least fourteen-seventeenths of the peninsula system, or approximately 82 per cent. Mr. Stearns, the Boston expert, has declared the Alameda system is "relatively and equally permanent with" the peninsula system (p. 4256). "The Alameda system . . . can be made to furnish a larger supply than any other source at a reasonable cost." (P. 4256.) Eighty-two per cent. of \$9,945,458 (Mr. Grunsky's valuation of the peninsula system on a basis of no doubt as to its "permanent serviceability") would be \$8,155,000 in round numbers,

as a value for the Alameda system, on the basis of established permanent serviceability estimated from Mr. Grunsky's figures. From this deduct the valuation given by Mr. Grunsky, on basis of doubt as to permanent serviceability, to wit, \$4,554,483, and we will have \$3,600,000 in round numbers. Add this \$3,600,000 to Mr. Grunsky's total estimates, however low they may be, and we have \$28,024,389.00 (Test. p. 175) plus \$3,600,000, or \$31,624,389.00 as the valuation of Mr. Grunsky—based on all parts considered by him in use and useful for producing water—and also on basis that the Alameda System is proven permanently serviceable.*

* As a matter of fact the Alameda properties have been demonstrated to be worth fully as much if not more than the peninsula property. Complainant's Exhibits 18 and 19 show the two properties in detail. There are 18,740 acres in the peninsula property and 27,633 acres in the Alameda Creek properties. The Spring Valley Water Company, when it ultimately has a storage capacity of 100,000 million gallons will then be more dependent for water supply on the Alameda system than on the Peninsula system. The ultimate storage capacity of the peninsula system is as follows:

Lake Merced	2,500 million gallons
Pilarcitos	1,000 " "
San Andres	6,000 " "
Crystal Springs	45,000 " "
Portola	3,000 " "
<hr/>	
Total	57,500 million gallons
(Schussler's test., p. 523.)	

The ultimate reservoir capacity of the Alameda system is:

Calaveras	40,000 million gallons
San Antonio and Arroyo Valle	20,000 " "
<hr/>	
Total	60,000 million gallons
(Schussler's test., p. 523.)	

In addition to this the Alameda system will produce by run-off above storage capacity, 14 to 15 million gallons per day. (p. 217.) Consequently,

Footnote, continued.

the Alameda system, taking into consideration its water rights and capacity for producing water is worth fully as much if not more than the peninsula system if they could be considered separately, but the value of each system is so interwoven with the use of portions of the other system as to make an accurate comparison of the two systems when separated almost impossible. This is shown by Mr. Schussler's testimony (p. 605) where the manner in which the full resources of the Spring Valley property will ultimately be developed is shown as follows:

"The Pilarcitos reservoir and the San Andres reservoir are now up to their proper and full limit of storage capacity. At the same time, should, during a very heavy winter, they fill up, and any of the water had to escape, it could be conducted into the main large Crystal Springs storage reservoir. The Crystal Springs reservoir, being located within 17 miles of its San Francisco distributing reservoir, is geographically very well situated to form the great center of accumulation, not only for the surplus of the waters from Pilarcitos and San Andres reservoirs, but also of the watersheds adjoining the Crystal Springs country to the south, namely, the San Francisquito Creek region, as well as that of the San Gregorio and of the Pescadero. As I have stated before, by an expenditure of a little over \$2,000,000 the Crystal Springs reservoir can be increased over the storage capacity that it was years ago planned should be its extreme limit, namely 29,000,000,000 or 30,000,000,000 gallons—I say it can be increased to 45,000,000,000 gallons, and it will be necessary eventually to do so, as the storage facilities on the Alameda Creek system will, although very good up to 45,000,000,000 gallons or 50,000,000,000 gallons storage capacity for the three reservoir sites combined, when the storage capacity for Alameda Creek water is to be increased beyond that proper storage capacity over there of, say, from 45,000,000,000 to 50,000,000,000 gallons—then such surplus water will find its place in the increased capacity of the Crystal Springs reservoir in conjunction with the waters from the local watersheds as well as from the coast streams and the San Francisquito combined. So that, as I emphatically stated before, even to-day the works have to be handled and managed as a unit. That will be still more the case as the capacity of these works is developed in the future. In fact, when the daily consumption of this city has increased to such dimensions as will require the development—even the full development of the Alameda Creek system—it will then be necessary to call into service the extra storage capacity on the west side of the Bay of San Francisco, namely, the Crystal Springs reservoir site, having by that time been enlarged to about 45,000,000,000 gallons. So that, at any time when required, surplus waters from the Alameda Creek system that would run to waste from the full reservoirs there if no proviso was made on this side of the bay to store such surplus waters, those surplus waters will then be run over and stored in the Crystal Springs reservoir. It is plain, therefore, that the one part of the works, the peninsula part, will

In addition to the foregoing estimates, there were those of three other experts produced by defendants, but two based their testimony on primal cost and one on the estimated value of an incomplete substitutional system. For those reasons there is no necessity to consider their estimates seriously, and we omit them from this preliminary study.†

Footnote, continued.

then need the Alameda Creek portion for additional supply, while the Alameda Creek portion will need the peninsula system of reservoirs for assisting in the storage of its surplus waters. In that manner, by properly carrying out the very carefully devised plans in the future of gradually, as the city's demand for water grows, increasing the storage facilities on the properties of the company, and also increasing necessarily, the conduit lines in capacity, the daily supply for San Francisco can gradually, economically, and always ahead of time be brought up to about 135,000,000 gallons a day, which is the probable consumption, as approximately estimated, in about sixty or seventy years from now."

In other words, these two properties are so interlinked that it is difficult to express their separate value, but certainly, to give the Alameda properties a valuation of 82 per cent of Mr. Grunsky's own figures on the peninsula properties, cannot be very far away from what his figures would have been had he agreed with the other engineers as to the continuity of supply of its Alameda system. (p. 605, Schussler.)

† Mr. Fitzgerald (p. 433) estimates the primal cost of the property at \$22,736,643.55, and to this he adds: "It is possible that the actual original cost of a plant might represent its present value, minus depreciation, plus appreciation." Mr. J. H. Dockweiler, for a short time city surveyor of Los Angeles and assistant to several people in the compilation of various figures regarding engineering works not completed, gave his valuation as to the cost of the works, as follows (p. 643): "If permanent improvements made during 1903 are deducted, as shown by expert Wenzelburger's report, and which amount to \$680,767.01, the cost of the works in use January 1, 1903, would be \$22,199,695.70"; and then, in order to avoid the effect of the decisions which hold that primal cost is only a factor and not the controlling element of value, he, a few pages afterwards, gives as his estimate of their present value, \$24,053,390.00 (p. 647). This is practically obtained by allowing interest on the cost figure for two years' time and adding this to primal cost (p. 648). The only other figure is that given by Mr. Duryea, who is chief engineer of the Bay Cities Water System,

5. PROPER INTEREST RATES; INCLUDING TABLE
SHOWING ANNUAL RETURN BASED ON
GRADUATED RATES.

Mr. Phelan, then Mayor of San Francisco, in his affidavit, gives the figures as proper rate of return on investment of over \$10,000,000 at four to five per cent. Mr. Daniel Meyer, San Francisco banker of thirty years' experience, Mr. George A. Moore, president of a life insurance company, and John Perry, Jr., stock and bond broker of forty years' standing, give it at not less than six per cent. Mr. George Tournay and Mr. J. Lloyd, respectively secretary and president of a large savings bank, give it at not less than six to seven per cent. Mr. R. J. Tobin, Bank President, gave it at not less than six to eight per cent. Mr. I. W. Hellman, banker of thirty years' standing, president of several trust companies and several national banks, and Mr. G. W. Klein, cashier of a national bank for twenty years, give it at not less than seven per cent. Mr. F. L. Lipman, cashier and vice-president of a national bank, gives it at least from six to eight per cent. Mr. H. Brunner, cashier of a trust company, gives it at not less than seven to eight per cent. Mr. Wm. Alvord, bank

Footnote, continued.

which is \$25,451,000.00 (p. 68), but this estimate was made with no calculation sufficient to warrant it being accepted and was based upon a substitutional system owned by a corporation which thought it was a rival of complainant, and the estimated value of which was based on figures which did not include the ownership of portions of proposed reservoir sites (p. 110), water rights (pp. 125-126), nor any actual figures on cost of pipe (p. 106), or cost of trenches (p. 107), and did not include any cost for rights of way (p. 104), nor cost for trestles, nor the like (p. 105). Consequently, the figures of the last three witnesses will be omitted from consideration.

president, gives it at not less than seven to ten per cent. See these affidavits on file in cases Nos. 13395, 13598, and also testimony (pp. 5851a to 5851k).

Blackstone says (Vol. II, p. 455) :

“Without some profit allowed by law there will be but few lenders, and those principally bad men who will break through the law and make a profit, and will then endeavor to indemnify themselves from the danger of the penalty by making that profit exorbitant. . . . We see that the exorbitance or moderation of interest for money lent, depends upon two circumstances; the inconvenience of parting with it for the present, and the hazard of losing it entirely.”

This last statement is also the principle upon which revenue is obtained from investments. Money is invested when in the judgment of the investor he will receive compensation (a) for the inconvenience of parting with the money for the present, (b) for the hazard of losing it entirely.

The same principle is stated by Mr. Grunsky in defining what he considers a proper theory for the board of supervisors to work on, when he says :

“The earnings of the company should be such that the company will receive operating and maintenance expenses, taxes and a reasonable return upon the amount of money invested. The aggregate amount of these elements is not dependent upon the valuation alone, but it depends as well upon the rate of interest considered reasonable. The money available for distribution in dividends may be the same with a *low valuation and a high rate of interest* as with a *high valuation and a low rate of interest.*” (p. 179, Grunsky.)

Also :

“Depreciation resulting from deterioration of the plant, or from other causes, should be taken into account in some way.” (p. 179.)

Applying these principles we will come very close to obtaining what should be the proper amount to be allowed to the corporation. If we take the valuations which are based upon figures which eliminate all element of risk, the rate of interest which should be allowed upon that valuation should be the rate of interest allowed on investments of that character ; as the element of risk is *increased* the rate of interest should be *increased*. The rate given by Mr. Phelan for investments at from four to five per cent. is the rate fixed on industrial and quasi-corporation bonds where all elements of risk have been eliminated, either by the properties having paid the interest on their bonds without question for a great length of time, or because the amount of equity over and above the amount of the bond issue is so great that the corporate stock issue sells for a very large fixed price in the market. This could not apply to bonds of a corporation whose property has any element of value with risk in it. It would be exactly as if complainant's property could be valued at the cost of a substitutional system, the cost of which would be so large as to make it certain that no substitutional system could be built profitably. This is practically the basis on which Mr. Stearns made his estimate of the value of complainant's property. His method would eliminate all element of risk in the valuation of complainant's property, and he fixed the

figure at \$70,000,000.00. (P. 4261.) This valuation is based upon his estimate of the actual cost in operative installation of the next most available water system (but which he himself admits is high for a rate fixing basis) and is therefore just over the highest possible valuation (p. 4474). Taking these two limits (one maximum of valuation and the other minimum of interest), and they may be considered tentatively to cure each other. Then going down the scale from Mr. Stearns' valuation of \$70,000,000.00 and up the scale from four per cent the lowest interest named, to follow Mr. Grunsky's suggestion, we can arrive, approximately, at the appropriate return by compensating the comparatively high valuation with the comparatively low interest rate. In other words, Mr. Stearns puts a maximum valuation of \$70,000,000.00 and Mr. Hering puts a maximum valuation of \$55,000,000.00 upon all the properties, taken as their estimate of the cost of a substitutional system. (The difference between Mr. Stearns' figures and Mr. Hering's figures is due to the cost of the extra pipe which Mr. Stearns thinks it advisable to commence to install at once in case Tuolumne were to be used.) These figures, both engineers affirm, are too high, saying that they demonstrate rather that the cost of the substitutional system is so large that the substitutional system itself is impracticable.

Similarly, Mr. Phelan's rate of return is too low, because certainly the risk in a water works investment is much greater than the risk of issuing bonds which pay four and five per cent. This principle is that set forth in the Circuit Court of Wisconsin when it said:

"The final inquiry, whether the net earnings shown are in excess of or equal to a just return upon the investment, presents no serious difficulty under the premises above stated. * * * The interest rate fixed in the bonds issued by the company is 5%. The rate which prevails in this market is 6% for real estate mortgages and like securities. * * * Surely a better rate must be afforded for the risks of investment than can be obtained on securities of this class (street car railways) in which there is no risk."

Milwaukee Electric Ry. & Light Co. v. City of Milwaukee, 87 Fed. 577, 586.

In Wilkesbarre v. Spring Brook Water Co., 4 Lackawanna Legal News, 367, the Court said:

"Good bonds * * * remain intact. They are not liable to change or diminution in principal. At a time certain the principal is to be paid to the investor to the last cent. *If the rate paid on such investments shall determine the percentage of profit to be paid water companies there would be no inducement for anybody to invest money in works of a public nature.* * * * Enterprise and industrial progress would be at a standstill. It must be remembered that those who embark in water companies place their property to a great extent in the hands of the public. * * * They must be always ready to supply the public demand, and must take the risk of any falling off in that demand. They cannot convert their property to any other use, however unprofitable the public use may become.* * * It is evident, therefore, that the rate of interest paid on city bonds is not by any means conclusive as to the return to which a water company is entitled on its investments." See also Beale & Wyman on Rate Regulations. Sec. 404.

In Brunswick Water District v. Maine Water Co., 59 Atl. 537, 540, the Court said:

"Those who engage in a public service cannot be put upon quite the same level as those who make mere

investments. They are not like the depositors in a savings bank, whose right to draw out is limited precisely to what they have put in. * * * They are, on the contrary, engaged in a business, with the ordinary incidents of a business, with some of the hazards and hopes of a business."

In San Diego Water Co. v. San Diego, 118 Cal. 556, 570, the Court said:

"Comparison must be made between this business and other kinds of business involving a similar degree of risk."

In *Brymer v. Butler Water Co.*, 179 Pa. 231 (36 Atl. 249), the following language is used, which is also quoted by the New Jersey Court in the case of *Long Branch Commission v. Tintern Manor Water Co.*, 62 Atl. Rep., p. 478:

"Ordinarily, that is a reasonable charge or system of charges which yields a fair return upon the investment. Fixed charges and the cost of maintenance and operation must first be provided for. Then the interests of the owners of the property are to be considered. They are entitled to a rate of return if their property will earn it, not less than the legal rate of interest. * * * Some towns are so situated as to make the procurement of an ample supply of water comparatively inexpensive. * * * What would be an extortionate charge in the first case might be the very least at which the water could be afforded in the other."

Taking the lowest rate given by Mr. Phelan and the highest value given by Mr. Stearns, we have four per cent on \$70,000,000.00, or \$2,800,000.00. Taking the next maximum figure that of Mr. Hering, \$55,000,000.00 (p. 3475), and the highest rate given by Mr.

Phelan—five per cent—we have five per cent on \$55,000,000.00, or, \$2,750,000.00.

Now, leaving the figures that are just beyond a possibly fair estimate and coming to the figures that are within the proper elements of value, we next have the estimate of value given by Mr. Schussler, \$51,500,000.00. This is based on a lifetime of experience, upon a careful study of the substitutional system and deducting from the gross value the valuation of the properties not now actually being used. It is an estimate such as an engineer would make upon an industrial property, handled in a highly conservative manner. This class of properties thus handled, according to the various bankers' testimony, should not produce less than six per cent (6%). Taking six per cent upon Schussler's valuation and we have an income \$3,090,000. (p. 1586.)

Mr. Hering's value, based upon the tangible and the intangible parts of Spring Valley, gives as the total valuation \$45,000,000.00 in round numbers and he considers that a fair and reasonable valuation of all the properties in use. (pp. 3471-3473 Hering's testimony.)*

* This is the opinion of a man who has been Chief Water Engineer of New York City and of Philadelphia, and has been chosen by the Government National Board of Health to visit Europe and report upon the sewerage system of various European cities during which trip he examined a number of water supply systems throughout Europe; who has been Chief Engineer of the City of Chicago's Water Supply and Drainage Commission, and been engaged by the Board of Public Works of New York for the bettering and developing of its water system, and also by the cities of Philadelphia; Washington; Pittsburg; Atlanta; New Orleans; Cleveland; Buffalo; Honolulu; St. Johns, Newfoundland; Toronto; Winnipeg; Victoria; Augusta, Maine; Gloucester and Boston, Massachusetts; Hornelsville, New York; Manistee, Michigan; Tacoma, Oakland, Sacramento, and Los Angeles. Mr. Hering is probably the

Mr. James D. Schuyler, who occupies about the same position in his profession on the Pacific Coast that Mr. Hering does on the Atlantic Coast, gives a valuation of the Spring Valley properties of \$46,000,000.00 (p. 5452). This valuation is reached by an entirely different method from that followed by Mr. Hering.*

Mr. Arthur L. Adams, the chief engineer of the Oakland Water System, who has been compelled to familiarize himself with all of the problems of handling water about San Francisco Bay points, reaches by an entirely different line of reasoning a valuation of

Footnote, continued.

highest authority upon municipal water supply and municipal sewerage in the United States.

* Mr. Schuyler has had a most varied experience in handling water on the Pacific Coast. He has built one of the largest dams in the world for the San Diego system and has probably been employed in expediting more water projects on the Pacific Coast than all other engineers put together. He has been assistant State Engineer, and, as such, has studied the water problems of California. He was also employed for a time by complainant in making an examination of San Mateo Creek, where complainant's main dam site is located (Crystal Springs). He is particularly well equipped for passing judgment in this matter. Besides designing the water system for San Diego, National City and Chula Vista, he has passed upon engineering problems for the following cities: Los Angeles; Redondo; Inglewood; San Bernardino; Bakersfield; Watsonville; Monterey; Santa Cruz; Hollister; Livermore; Redding; Denver; Pueblo; Portland; Helena; and Prescott. He has been employed by the United States Government to write on various water subjects, and has been employed as Consulting Engineer for the Tri-State Land Company of Nebraska, engaged in building extensive irrigation works on the North Platte and the Republican rivers; the Twin Falls Land and Water Company on the Snake River; as hydraulic engineer for the Mexican Light and Power Company at the City of Mexico; as Consulting Engineer of the Bay Counties Power Company on Feather River. He was Engineer and Expert Witness in the following well-known cases: *Lux v. Haggin*; *Gould v. Eaton*; *San Diego Water Co. v. City of San Diego*; *City of Los Angeles v. Pomeroy & Hooker*; *City of Los Angeles v. Crystal Springs Land and Water Co.*; *City of Los Angeles v. West Side Water Co.*; *Vineland Irrigation District v. Azusa Irrigating Co. et al.*; *McClintock v. Hulson*; *McPherson v. Cucamonga Fruit Land Co.*; *Contra Costa Water Co. v. City of Oakland*, and *Stevenson v. Miller & Lux*.

the properties now in use by the complainant of \$44,-690,000.00. (Adams' testimony, p. 4766.)*

In addition, Mr. George Reynolds, expert accountant, has calculated the interest that could have been obtained from investment of the moneys actually expended by complainant at various times at then ruling commercial rates of interest, and has deducted therefrom the amount of dividends actually paid by complainant, increased by the then ruling interest and the gross amount thus obtained as shown by complainant's Exhibit 104 (p. 4622), increased by the money actually invested through sale of bonds, made the total investment of complainant on January 1st, 1904, \$50,513,-722.98 (p. 5513).

Deducting from this the value of properties purchased, which are not now in actual use (p. 1586) \$4,500,000.00, and we have as the valuation of the properties now in use, \$46,000,000.00, which is practically the valuation given by Mr. Hering, Mr. Schuyler, and Mr. Adams.

Now, this valuation of \$45,000,000.00 is made from four different sources and in four different ways. It is the valuation that would be used by a man interested in investments referred to by bankers and brokers who

* In addition to Mr. Adams' knowledge of the water situation, brought about by his necessarily exhaustive studies on account of his employment by the Contra Costa Water Company and Oakland Water Company, Mr. Adams has had a broad experience in the supervision of construction of water systems and municipal sewer systems at Waitsburg, Washington; Colfax, Washington; Dayton, Washington; La Grande and Astoria, Oregon; Montesano, Washington; Eureka, California; Los Angeles; Pasadena; Portland, Oregon; Lakeport; Porterville; and Centralia, Washington; and has been Consulting Engineer in various hydraulic propositions, as set forth in his testimony at page 4644.

make the rate of interest six to eight per cent. Taking the average rate of return suggested by them as minimum, to wit, the legal rate of interest—seven per cent—which would be the next rate available to follow out the method already suggested, and we have as the proper return to complainant seven per cent on \$45,000,000.00, or, \$3,150,000.00.

The next figure is that of Mr. Grunsky. As already modified in this argument, Mr. Grunsky's figures become \$31,600,000.00. In this figure Mr. Grunsky omits all properties which are not now actually producing water. He makes complainant carry without any return the greater part of the investment in the Calaveras Creek, San Antonio Creek and the Arroyo Valley Creek, and the Searsville system on the Peninsula. If the complainant's prudent forethought and appreciation of the future needs of San Francisco's growing population had not induced it to acquire these last mentioned properties several decades ago, they could not now be acquired at all. Without them San Francisco would be facing a water famine in 1910; with them San Francisco can gradually develop a water system sufficient to take care of its necessities for the next forty years. Moreover, Mr. Grunsky allows nothing for original risk of the enterprise nor for engineering skill.

In other words, by Mr. Grunsky's method, complainant is compelled to carry about 25% of its holdings without any return. Certainly, therefore, the other seventy-five per cent which cannot be operated successfully without this risk being taken, should have a greater return than that of any risk referred to by the

bankers as being not less than 8%. Take this figure at 10%, which is less than any commercial venture produces where a large part of the capital is compelled to remain idle, and we have as an annual return ten per cent on \$31,600,000.00, or, \$3,160,000.00 per annum. Tabulated, these figures become:

TABLE SHOWING ANNUAL RETURN—BASED ON GRADUATED RATES.

Engineer.	Amount.	Rate, per cent.	Annual Income.
Stearns	\$70,000,000	4	\$2,800,000
Hering's maximum figure	55,000,000	5	2,750,000
Schussler	51,500,000	6	3,090,000
Hering's practical value, Schuyler, Adams, and Accountant Reynolds.....	45,000,000	7	3,150,000
Grunsky	31,600,000	10	3,160,000

The average of all these is \$2,990,000.00, or, practically, \$3,000,000.00, the amount which complainant sets forth in its bill in this action as the proper return to be allowed it.

We believe that the Court must conclude that the proper valuation from a practical point of view is \$45,000,000.00, given by the three experts, Hering, Schuyler, and Adams. The element of risk assumed by these three gentlemen is that of an investment in a conservatively managed industrial corporation, the rate of interest on the bonds of which currently run from five to six per cent.

Again referring to the last three preceding tables, we feel certain that the court will agree with us that the proper valuation of complainant's property is \$45,000,000.00; that the gross return which it would have received under the 1903 ordinance, to wit \$1,943,941.06

(p. 5834) must have deducted from it, not only the operating expenses (\$556,786.97) and taxes (\$325,287.66) but an annual depreciation fund of at least one per cent of the structural properties liable to depreciation, amounting to \$198,060. This leaves the net return available to pay interest on property used and useful in providing water for San Francisco and its inhabitants, \$863,806.43, which is less than two per cent upon the fair valuation of \$45,000,000.00 and approximately three and one-half per cent on the \$24,124,389.00 taken by the board of supervisors. It must be apparent that not only is the 1903 rate grossly inadequate, but also the 1902 rate was itself also grossly inadequate, and that the reduction of the hydrant rate from \$5.00 to \$2.50, despite the loyal service to hundreds of homes at 22 cents per month by complainant after 1895, was not only grossly unfair, but had such a tendency to "hammer down" the prices of complainant's property as to make it a taking without due compensation and without due process of law.

VI. THE PHYSICAL SITUATION.

1. IN GENERAL.

2. VARIETY OF SOURCES—

a. *Peninsula System.*

A. Pilarcitos Reservoir.

B. San Andres Reservoir.

C. Crystal Springs Reservoir.

b. *Alameda System.*

c. *Lake Merced System.*

3. LAND HOLDINGS AND WATER RIGHTS IN CONNECTION WITH PENINSULA SYSTEM.

4. SAN FRANCISCO DISTRIBUTING RESERVOIR AND PIPE SYSTEM.
5. PUMPING STATIONS.
6. TABLE SHOWING DISTRIBUTING RESERVOIRS, WITH THEIR APPROXIMATE ELEVATIONS AND CAPACITIES IN ROUND NUMBERS.
7. CITY PIPE SYSTEM.
8. DIFFICULTIES OF DISTRIBUTING AND HOW SURMOUNTED—
 - a. *As to Division in Districts of Same Height.*
 - b. *As to High Character of Iron in Pipe.*
9. HISTORIC REVIEW OF THE WATER SUPPLY IN SAN FRANCISCO.
10. PROSPECTIVE GROWTH OF SAN FRANCISCO, INCLUDING TABLE SHOWING ANTICIPATED DAILY CONSUMPTION.
11. HOW COAST STREAMS COULD BE CONNECTED.
12. PROPERTY MAINTAINED BY COMPLAINANT, AS INSURANCE OF CONTINUITY OF SUPPLY BY INTERCHANGEABILITY, DUPLICATION, BY TIMELY ACQUISITION OF WATER RIGHTS, AND THE LIKE.
13. WATER RIGHTS AND WATERSHEDS.

I. IN GENERAL.

The Court will be able to grasp the location of properties graphically by examining Complainant's Exhibit No. 85, which is a map showing the present centers of population of San Francisco and vicinity, and also future aggregation of population, and its probable future centers. This is described in Mr. Schussler's testimony at page 1544, and a photograph of it is included in the addenda to this brief. It also shows

approximate convenience and availability of the sources of water supply, present and future. This is drawn to scale, and has various shadings. The property on the peninsula has a dark red shading; this includes the watersheds at present in use for supplying San Francisco with water, also the Crystal Springs, San Andreas and Pilarcitos reservoirs and also the Lake Merced reservoir. It also shows, in yellow, the pipe-lines leading from these reservoirs into San Francisco and to their respective distributing reservoirs in San Francisco. It also shows, in different shadings, the location of towns along the railroad line on the peninsula, and with coarser shading, the region that is rapidly filling up with suburban population. It also shows, on the east side of the Bay, the watershed from which the Spring Valley Water Company is now drawing water, and by "now" is meant, at the time of taking testimony. (It was stipulated during the trial that values when used in the present tense might be considered to apply to February, 1903, and to February, 1904 (pp.12-13).) It shows the watershed of about 600 square miles in Alameda Creek territory, also the three proposed reservoir sites, one in Calaveras Canyon, one in San Antonio Canyon and one in Arroyo Valley Canyon. It also shows the location of the Sunol filter beds, and the present route down the Alameda Creek Canyon of the Sunol aqueduct, which brings the present water to San Francisco.

The relative locations of these properties is shown by Complainant's Exhibit No. 12, which is a photograph of a relief map of the same territory, giving

practically a bird's eye view of the situation. This map is described in Mr. Schussler's testimony at page 320. The dark blue shading is the location of the four reservoirs now in use in the peninsula, including Lake Merced (a portion of which is in the city limits), and the watershed adjoining on the San Francisquito Creek connected with the Portola reservoir, is marked in blue with another line around it. The coast streams are shown as San Gregorio and Pescadero. This map also shows in paler colors the proposed reservoirs at Calaveras Valley and San Antonio Valley, and also on the Arroyo Valle, which is the creek lying next east of the Calaveras and San Antonio system. A photograph of this exhibit has been made and is included in the addenda to this brief.

The relative size of this watershed compared with the Tuolumne watershed proposed as the next nearest substitutional system, is shown in Complainant's Exhibit No. 3, which is a map showing the geographic and hydrographic conditions of the Spring Valley properties and the Tuolumne scheme. This is also shown in Exhibit 2 in a technical form by maps showing the elevations above tide water and the distances from San Francisco of the two systems—the Spring Valley system and the Tuolumne system. Photos of Complainant's Exhibits 2 and 3 have been made and are included in the addenda to this brief. These maps are described at pages 97 and 99 of Mr. Schussler's testimony.

The manner in which these various sources of supply are connected with the distributing reservoirs in

San Francisco, is shown graphically by Complainant's Exhibit No. 22, a general profile map, in colors, drawn to scale, delineating the elevation of the various points of in-take and of distribution throughout the entire system. The Pilarcitos system is shown in blue. The water can be traced as it is brought by gravity from the lake itself into the various distributing reservoirs in San Francisco connected with it. Crystal Springs is shown in yellow, San Andreas is shown in red, and the Alameda system is shown in green. The manner in which these waters are intermingled at Millbrae and other points, is also shown. Lake Merced is shown separately in drab. A photograph of this map has been made and is included in the addenda to this brief; it was formally introduced in evidence at page 955, after certain addenda had been made to it, but it is explained in detail in Mr. Schussler's testimony at pages 638-665.

The city's distributing system is further shown by Complainant's Exhibits 23, 24, 25 and 26. Exhibit 26 is a map of the main arteries; Exhibit 23 shows the distributing reservoirs; Exhibit 24 shows the profile of interlocking system, and Exhibit 25 shows the contours of the various hills in San Francisco with the districts supplied by them in various colors. These are all described in Mr. Schussler's testimony from pages 668-689, and photographs of them are included in the addenda to this brief.

The state of California has a rainy season during about five winter months and a dry season during the remaining seven summer and fall months (Schussler's testimony, p. 572).

The climatic conditions of California are such that owing to the occasionally two or three successive dry and unproductive winter seasons the streams largely decrease in volume and in many instances dry up altogether. In order, therefore, to maintain a steady and constant supply of water no matter whether the rainy season is wet or dry, it is absolutely necessary to store in lakes or reservoirs the surplus waters of the wet rainy seasons so as to tide over the dry seasons and the effect of so-called dry winters which are certain to recur here from time to time. The climate requires from two to three years' storage (Schussler's testimony, pp. 35 and 545; Hering's testimony, p. 3433; Stearns' testimony, p. 4209; Schuyler's testimony makes it four or five years, p. 5379; Adams' testimony, p. 4652; Col. Mendell's Rep. to Supervisors in 1877 (p. 38, Schussler's Testimony).*

*The danger of these dry seasons and the importance of providing against them is shown by Mr. Schuyler. He testified at page 5393:

"There is no regularity about the volume of rainfall in the rainy season, one year after another, or in the continuity of storms or the manner in which the rain comes in any one storm. At times the rain falls with great violence and there is a very large percentage of run-off which may be caught in the reservoirs. At other times it comes in showers in such a way as to be practically all evaporated or held in the soil without giving very much in run-off to the streams. So that there is a very great irregularity and fluctuation not only in the amount of rainfall, but in the manner in which it is given to the earth, and the amount of run-off.

"Q. 70. Have you known years, or periods of years, that have been during the winter season practically what might be called droughts or dry seasons?

"A. Yes, sir, quite a number of them, during my period of residence in this State.

"Q. 71. For how many consecutive years has such an event occurred at any one time?

"A. Two consecutive years on several occasions, and sometimes three or four. In Southern California there have been recently

Footnote, continued.

nine to ten years of comparative drought when the rainfall was below the normal."

Again, at page 5392, Mr. Schuyler testified:

"The season of drought, or lack of rainfall, is so pronounced as to permit everyone to rely for weeks and months at a time upon there being no rain to interfere with business or pleasure, whereas in the East rain falls to a greater or less extent throughout every month of the year. The contrast between the wet and the dry season in California is exceedingly pronounced."

Mr. Hering testified (p. 3391):

"Inasmuch as there are no large fresh water streams in the neighborhood of San Francisco where a sufficient water supply could be obtained during the dry seasons of the driest years, the most essential requisite is an artificial storage of water so that the storage during the wet season will furnish sufficient water during the dry seasons."

Also:

"Inasmuch as the average rainfall about San Francisco is, roughly speaking, not much over half of what it is in the East, and as, for about one-half of the year there is no rainfall at all which can replenish the water flowing in the streams, it will be necessary to store much larger quantities in this locality than anywhere in the Eastern States, where the average rainfall per month does not vary much throughout the year, and where the rainfall is much more abundant. I might add, even the amount of water falling during the rainy seasons is much more variable here than in the East. There has been a year where the rainfall in San Francisco in one season, 1889-90, was as much as 52.27 inches, and another year, 1897-98, where it was as little as 10.08 inches. It also often happens that several dry years follow each other in succession, the most striking periods of this character occurring from the years 1868 to 1871, and 1897 to 1904. The run-off from the surface varies even more than the rainfall. I might further add that, in one year, the evaporation in one locality was greater than the run-off."

* * * * *

"I deem it absolutely necessary, under the conditions existing here, to have provision for storing enough water to supply the City of San Francisco from stored water alone for two or even three years. This is necessary for the reason that a fresh water supply, particularly for a large city almost surrounded by salt water, is an absolute necessity at all times, and no chances whatever should be taken to leave such a city in danger of a serious reduction of the water supply." (Answer to question 33.)

Footnote, continued.

"Q. 34. Taking your experience and expressing your opinion I would ask the essential factors and necessities for a municipal water supply for a large city on this coast?

"A. First, a sufficient quantity of water at all times; second, a proper quality; and third, reliability in the service."

Again:

"Q. 85 (p. 3406). To what fact do you ascribe the condition that there is no rainfall in this vicinity, or in the neighboring counties, in the summer months?

"A. Chiefly the fact that there is a cool ocean current flowing southwardly near the coast of California. There is less moisture suspended in cool than in warm air. Saturated air, therefore, will precipitate moisture when air is cooled and absorb moisture when air is warmed. Consequently, in winter months, when the land is apt to be cooler than the ocean, precipitation occurs; while in summer, when the land is warmer than the ocean, it does not. Further, the degree of saturation depends also upon the density of the air; the denser the air, the more moisture can it hold in solution. Therefore, if saturated air is rarified, there is precipitation, and, vice versa."

Again:

"Q. 314 (p. 3478). Mr. Hering, comparing the plant of the Spring Valley Water Company as a water supply system for San Francisco with the water supply plants or systems of the larger cities of the eastern portion of the United States, is there any variation in that particular between the relative cost of the two; that is to say, this plant located here in this vicinage and the eastern plants?

"A. In many eastern cities the water is taken from streams or lakes, which furnish them with their entire supply irrespective of any storage. In those cases no expense attaches to storage. In San Francisco, at present, about one-half the water is obtained entirely through storage; the other half being taken from the Alameda Creek system, the low water flow of which at present supplies sufficient water, but the necessity of increasing the supply by artificial storage reservoirs in a very few years already exists in that valley."

"Q. 315. Under these conditions, what would, approximately, be the difference in cost, first, in relation to stored water, between here and the East?

"A. As it takes about five times the storage capacity here to furnish the same uniform delivery of water as it does in the East, it naturally will cost more here. I would roughly estimate it, as a general proposition, to be about three times more here.

"Q. 316 (p. 3479). Now, taking the second proposition; taking the proposition of water in the East drawn from lakes or water

Quotations from the reports of various engineers as shown in the Municipal Reports, including Scowden and Mendell, and Mr. Schussler's deductions therefrom, are given in the testimony (pp. 317-319 inclusive). The great necessity for reservoirs under our very variable climatic conditions, is shown by the quotations of these gentlemen, Scowden, Mendell and Grunsky, who were, at the time they made their respective reports, in the employ of the City and County of San Francisco.*

Footnote; continued.

courses of sufficient size compared with San Francisco, and stored water?

"A. In this case, of course, the additional expense in San Francisco would be that due to the provision of storage reservoirs, none of which are needed in the other case.

"Q. 317. Do you know of any other difference between the comparative cost of this plant and plants in the East?

"A. The cost of iron in California is materially greater than in the East.

"Q. 318. In what respect?

"A. The iron used here is brought from the East, for the most part, and it is necessary, therefore, to pay, in addition, for the freight to get it here."

* * * * *

Again (answer to R. D. Q. 12, p. 3951) :

"The rainfalls in the East, during the heavy downpour, are much more intense than here; that is, a larger quantity falls in a short time. The practical result is seen by the fact that the sewers of the cities in California can be constructed for a much smaller run-off of the intense storms, which fixes their capacities, than in the East. Those sewers must be built or should be built sufficiently large to carry off the water of the most intense storms, and because such intensity is less here than in the East the sewers can be proportionately smaller."

*The climatic conditions showing rainfall and the like are given in detail in Mr. Schussler's testimony at pages 84 et seq. The reason for no rainfall during the summer months is explained at pages 87 et seq.; Schussler's testimony, p. 545, also, p. 182; Colonel Mendell's report to the Supervisors in 1876, Municipal Reports 1876-7, p. 829; Scowden's

Without the reservoirs there were five years since 1897 when San Francisco would have been without water (Schussler's testimony, p. 127.) The necessity of storing the surplus or waste water has been proven beyond a shadow of doubt. It is recognized by the irrigationists who take water from the Sierra Nevada streams having sources in perpetual snow. (Schussler's testimony, p. 339, including Complainant's Exhibit 13.)

The relative rainfall of San Francisco and the Sierra country for purposes of practical catchment of water is shown in Complainant's Exhibits 13 and 14 (Schussler's testimony, p. 406).

A catchment is different from rainfall, because the water which runs off the stream and is capable of being caught is not directly dependent upon rainfall until after the ground is so thoroughly saturated that all the water runs off. Pending the time that the ground becomes saturated, from 100 per cent down to 20 per cent (dependent upon season) is absorbed by the ground itself and infiltrated, thereby making the total amount possible to be caught where reservoirs are amply sufficient, anywhere from zero to 80 per cent of the total

Footnote, continued.

Report, Municipal Reports 1886-7, p. 827; Grunsky's Report, Municipal Reports 1902-3, p. 115. Complainant's Map, Exhibit 4, showing growth of reservoirs and the necessity for same, is introduced in Schussler's testimony, pp. 116-126; table showing rainfall and amount thereof saved, is explained in Schussler's testimony, pp. 128-141. The necessity for maintenance of reservoirs because maximum flow must be held to tide over minimum yield, shown at pp. 141-142, also p. 182. All streams in California are extremely low in the late summer months (pp. 183-184). Rivers from the Sierra Nevadas carry from 39 cubic inches in late fall to 8046 cubic inches in winter and spring; tables for five such rivers are given at pages 336-349.

rainfall, dependent upon whether the rain comes in a torrential form carrying with it run-off, or slowly.

The same principle that holds good for a general irrigation scheme, holds good in a greater degree for supplying a municipality with water for domestic, manufacturing, municipal and other purposes.

People crowded together in a large municipal city require a constant, reliable and good water supply, with sufficient water for flushing of sewers, for manufacturing, shipping and other purposes, and for fire protection. An abundant supply of fresh and potable water in large and ever increasing quantities is, and always will be, more difficult and more expensive here than in eastern cities, owing to the climatic conditions, the high cost of labor and materials, the high cost of water rights, the high cost of watersheds, and the high cost of storage reservoirs (Schussler's testimony, p. 572, also p. 45), and more particularly because of the high cost of distributing owing to the high hills in San Francisco (p. 574), requiring nine distributing reservoirs at elevations of from 165 to 600 feet. Complainant's Exhibit 25 shows the city distributing reservoirs and the several districts supplied, in colors. The contour lines show the broken character of the hills, and as Mr. Schussler testified:

"The configuration and topography of San Francisco, with many isolated and scattered hills and ridges to supply, each one requiring specific and separate reservoirs and pipe systems, makes San Francisco the most difficult and complicated of the larger cities of the United States to supply with water." (p. 1448.)

The Spring Valley Water Company, which is the plaintiff in all suits subsequent to 1903, is the successor of the Spring Valley Water Works, which is the plaintiff in the 1903 case (No. 13395).

How this corporation grew rapidly as the needs of the city required water expansion, is shown in Mr. Schussler's testimony (pp. 157-175). He built this unique system having constantly in mind the necessities of the city for five or ten years in advance, which was absolutely necessary in order that it might not at any time confront a shortage of water. As this was practically the only corporation (complainant and predecessors at all times furnishing over ninety per cent of the water since 1865), it was necessary for the complainant to take care of the reasonably immediate future demands of the city (Schussler's testimony p. 402-5). Consequently, it has always been necessary for Spring Valley to be prepared to furnish from 25 to 75 per cent more than the water actually being used; for instance, at the time the testimony was taken, on individual hot days San Francisco would draw from 40,000,000 to 42,000,000 gallons of water per day (Schussler's testimony p. 405), while the average daily consumption was between 32,000,000 and 33,000,000 gallons. Storage has therefore been necessary to take care of these individual days and to offer the necessary element of facile expansion. The story of the growth of Spring Valley and of the necessary holdings of property capable of producing from 25 to 75 per cent more than the average amount of water actually being used, is shown by the testimony of Mr. Schussler (p. 403), as follows:

Year.	Average amount used.	Amount Spring Valley prepared to furnish.
1865.....	2,360,000	4,000,000
1868.....	4,320,000	7,000,000
1871.....	6,600,000	11,000,000
1878.....	11,370,000	16,500,000
1885.....	17,050,000	18,000,000
1889.....	16,850,000	24,000,000
1893.....	19,060,000	27,000,000
1901.....	26,670,000	31,000,000
1903.....	31,590,000	35,000,000*

* Profile map, Complainant's Exhibit 5, which is also a supplement of Complainant's Exhibit 1, shows the average daily consumption of water in San Francisco since 1865 up to 1903. This is all shown in detail in Mr. Schussler's testimony at pages 157-175.

Mr. Grunsky said of these works:

"The limit of resources in the matter of water development, forming natural extensions of the established system on the peninsula, as well as east of the Bay, is far from being reached, . . ." (p. 201.)

"The requirements of this city in the immediate future, expressed in round numbers, may be placed at 30,000,000 gallons per day. No system of works which is not capable of producing this amount of water and which is not readily expanded to twice this capacity with possibilities of further expansion, should be regarded as fully adequate to meet this city's ultimate needs. . . ." (p. 202.)

"The Coast Range areas on the peninsula, as well as the Coast Range regions east of the Bay of San Francisco, whose run-off waters can be made available by storage works being soil-covered, are to a considerable extent in actual use as stock ranges, . . . There is no snowfall to speak of. Practically all precipitation is in the form of rain." (p. 202.)

"Rainstorms are expected only from November to the end of April. They rarely occur after May 1st or before the beginning of November." (p. 203.)

"As there is no summer rainfall in Coast Range regions near San Francisco Bay to keep up the water supply to the creeks, and no winter snow to equalize the flow of the streams which drain these nearby Coast Range regions, and because these regions are broken up into many drainage basins of small extent, there are no streams near by of large perennial flow. (p. 204.)

"This is particularly true of the peninsula creeks. They are all torrential in character. To make them or the creeks east of the Bay available as sources of supply for a large city, it becomes necessary to store their waters in order to equalize their yield. . . . It is also necessary to prevent or at least minimize danger of water pollution, . . . (p. 204.)

Footnote, continued.

"In the established works this has been done in part by acquiring watershed areas and controlling the uses to which they are put, in part also by taking advantage of gravel beds to secure a natural filtration of the water." (p. 204.)

"San Francisco needs and should have the best water that can be obtained at a reasonable cost. The major portions of the present supply comes from storage reservoirs. . . . Only about one-third, that from Sunol gravels, may be called filtered. The wholesomeness of the water delivered has been established by long continued use." (p. 221.)

"Fortunately their actual use for half a century is a strong argument in their favor, and their quality as determined when stored in large reservoirs and brought long distances in pipes under pressure is a much better guide than any examination of the living stream before its water is given an opportunity of becoming clear and freed from original impurities." (p. 222.)

"These established works cannot be ignored when an earnest move is made toward the acquisition by the city of municipal water works. In their entirety they are comparable with the other projects that are or have been under consideration. . . . In the first place, the works have the advantage of being already constructed and in actual use. They are supplying between 25,000,000 and 30,000,000 gallons of water per day. Their distributing system, which, with its 400 miles of pipe, reaches every important establishment in the city, and from which some 50,000 private services are supplied, will either come into use with any other project, or it must be practically duplicated in case that it be not made part of the municipal system. Other portions of their works, even though their water sources be ignored, would still prove valuable to safeguard the supply from distant sources. In the second place, the sources of water utilized by the Spring Valley Water Works are near at home." (p. 306.)

"They are capable of further expansion, notably by the construction of the San Antonio Creek and Calaveras Valley reservoirs. The former would add about three to five million gallons per day; the latter, if developed to its full capacity, would deprive the Sunol gravels of an inflow of possibly 5,000,000 gallons per day, while yielding 25 to 30 million gallons for delivery across Santa Clara Valley by tunnel and pipe." (p. 307.)

"The Searsville property of the Spring Valley Water Works can also be brought under contribution. Its productiveness may reach about 7,500,000 gallons per day, of which a portion goes to the supply of the Leland Stanford, Jr., University." (p. 308.)

"The Spring Valley Water Works system, to the extent of its capacity, ranks first in the reliability of service. . . . In the matter of first cost to the city the advantage should be in favor of the Spring Valley system. . . .

"It is to be added that in the matter of operation it remains uncertain which system, the Tuolumne River project or the Spring

To-day complainant owns properties (18,740 acres in San Mateo and San Francisco peninsula and 26,737 acres in Alameda and Santa Clara counties) which will enable it gradually, step by step, along the true principles of evolutionary growth, to expand to a delivery of 100,000,000 gallons per day, ON COMPLAINANT'S OWN PROPERTY OWNED BY IT IN FEE SIMPLE. Mr. Schussler testified:

"Q. 692. These properties on which you are now developing . . . are owned by the company?

"A. They are owned by the company and they can be developed easily to-day up to 100,000,000 gallons per day."

"Q. 693. Then it is simply a matter of construction and not a matter of any more purchasing of property?

"A. It is simply a matter of *construction of works* ahead of time to meet the constantly growing demand for water." (p. 407.)*

Footnote, continued.

Valley Water Works, would have the advantage—the probability being in favor of the newer system. . . . Under a combination of those two projects only a part of the Spring Valley Water Works' properties would be required." (p. 316.)

* A general description of the San Francisco distributing reservoirs will be shown in Mr. Schussler's testimony at page 80, and the size and capacity of storage and their various heights is shown in Mr. Schussler's testimony, pp. 295-297. The amount of rain saved by the various reservoirs is shown in the table, pp. 128-141, and profile map (Exhibit 4) showing growth of the reservoirs, together with Mr. Schussler's testimony explaining the same (pp. 116-126), shows the storage capacities.

2. VARIETY OF SOURCES.

The present water sources of the Spring Valley can be divided into three groups:

- a. Peninsula system (shown on Exhibits 18 and 19 and Exhibit 85);
- b. Alameda Creek system (shown on Exhibits 12, 18, 19 and 85);
- c. Lake Merced system (shown on Exhibits 9, 10, 11 and 85).

a. The Peninsula Reservoir supply in San Mateo County comprising three storage reservoirs:

- A. The Pilarcitos Reservoir.
- B. The San Andres Reservoir.
- C. The Crystal Springs Reservoir.

A. The Pilarcitos Reservoir is formed by a clay dam with puddle core about ninety feet in height, at about 700 feet elevation above tide and of a capacity of about 1000 million gallons. It was, at the time the testimony was taken, connected with the Lake Honda Distributing Reservoir in San Francisco, of 365 feet elevation, by means of a conduit consisting of three tunnels, a 30-inch wrought iron pipe line, and about one and one-half miles of redwood flume. It is 17 miles from the city.*

* In addition to the depicting of this reservoir on the Exhibit showing the general properties of the Company, Complainant's Exhibit No. 28 shows the plan of the Pilarcitos dam, Exhibit No. 29 shows its cross section, and Exhibit No. 30 shows an ideal cross section giving the method of its construction. Mr. Schussler described in detail the manner of its building at pages 711 to 722, and gave in particular the description of the upper Pilarcitos dam at page 723. The cost of the Pilarcitos dam

Mr. Schuyler considered the water in Pilarcitos of more value than if it were on the level of the sea because of its elevation. (Test. p. 5623.) It can be readily seen that the water in Pilarcitos is able to be delivered in San Francisco through the pipe-line without the expenditure of any money whatsoever, while the water from any tidewater source must be pumped several times. Mr. Stearns found that the reservoirs had been chosen with very good judgment (p. 4269), and was much impressed with the good quality of the workmanship and of the material used in construc-

Footnote, continued.

proper is given in detail at pages 726 to 735, and the cost of the entire Pilarcitos system is given at pages 735 to 806. Exhibit No. 31 shows a blue print of the Pilarcitos waste weir; Exhibit No. 32 shows the Pilarcitos gatehouse; Exhibit No. 33 shows its forebays. These are all described in Mr. Schussler's testimony from pages 711 to 766. The story of the work performed by the Pilarcitos is shown very graphically in Complainant's Exhibit No. 34, which is a longitudinal profile of the Pilarcitos conduit line, drawn to scale, and shows the elevation of the pipe at several locations along the line and in San Francisco. This was described by Mr. Schussler very comprehensively at page 784, and was formally introduced at page 789. Photographs of this property, together with photographs of all the properties, are shown in Complainant's Exhibit No. 27. The photographs depicting Pilarcitos are shown more particularly on pages 14, 15, 16 and 17, and are described in Mr. Schussler's testimony at pp. 711 et seq. The manner in which the dam itself was constructed is shown by the last mentioned photographs and testimony.

Concerning the character of this work Mr. Hering said:

"This structure is, in my opinion, both proper and expedient. It was not built extravagantly, and the method of its construction was usual; it is necessary to build a water tight part of an earth dam, and it may be either a corewall of concrete or of clay. It was necessary to have a core to it to make the dam perfectly safe. I should consider it a very proper method of construction." (Test., pp. 3419-3420.)

He also found the rainfall in Pilarcitos exceptional, and greater than in San Francisco (p. 3974), and that the peninsula system throughout was characterized by a great degree of safety. (p. 3769.)

tion, and that no extravagance had been used in obtaining too many water sources.* (p. 4269.)

B. The San Andres Reservoir is formed by a clay dam about 90 feet in height, with a puddle core. Its elevation above tide is about 450 feet, and it has a storage capacity of about 5,500 million gallons. This reservoir is connected with the College Hill Distributing Reservoir in San Francisco (at an elevation of about 255 feet) by a pipe line consisting of 44-inch, 37-inch and 30-inch wrought-iron pipes. It is 16 miles from the city.†

* Mr. Stearns also testified that the Pilarcitos was first-class in material, workmanship and design (p. 4243), and Mr. Schuyler testified that on account of its high altitude and its close proximity to the city and to the coast, and the high annual rainfall which its watershed receives, it is one of the most valuable sources possessed by the company.

"The run-off from that particular watershed is greater per unit of area than any other of the sources of supply owned by the company. Its altitude is sufficiently great to enable its water to be delivered to the Lake Honda reservoir by gravity at an elevation of 367 feet. As to the propriety of the method of construction of that dam, my opinion is that in all probability the methods employed, as described by Mr. Schussler, could not have been improved upon. The stability of the work as demonstrated by the long period of time which has elapsed since it was constructed and first put in service, is a demonstration of the excellence of the methods employed in its construction, and the propriety of such methods, in the light of the entire success following them, cannot be questioned." (Schuyler's tes., p. 5417.)

With reference to the upper Pilarcitos dam Mr. Hering said that it was useful as a settling receiver (p. 3650), and Mr. Stearns testified that its construction was highly proper. (p. 4243.) Mr. Hering also testified that they oftentimes constructed decanting reservoirs for sewage purposes in the same manner. (Hering's tes., p. 3651.)

† In addition to the depicting of these properties in the various exhibits showing the general properties of the Spring Valley, the following apply to this particular dam, viz.: Exhibit No. 35 (p. 809) shows a blue print of the San Andres dam; Exhibit No. 36 (p. 809) shows an ideal cross section of the dam with its puddle pit; Exhibit No. 37 (p. 809) shows

C. The Crystal Springs reservoir is formed by a concrete dam at present 145 feet in height above its base, its present top being at 280 feet elevation above tide. Its present storage capacity is 19,000 million gallons. It is connected with the University Mound

Footnote, continued.

the longitudinal section; Exhibit No. 38 (p. 810) shows the cross sections of the dam; Exhibit No. 39 (p. 819) shows the longitudinal sections of the waste weir; Exhibit No. 40 (p. 844) shows a blue print of the gatehouse; Exhibit 41 (pp. 845 and 860) shows the tunnel profile connecting forebay with the reservoir. For a comprehensive showing of the connections of the San Andres system from the reservoir to the College Hill Reservoir in San Francisco, see Complainant's Exhibit No. 42, a profile map drawn to scale. It is described at page 867 and shows the connection of this system with the properties referred to in Complainant's Exhibits 21 and 22.

The photographs in Complainant's Exhibit No. 27 show the detail of the construction of this work; they are found mainly on pages 15 and 16 of the Exhibit and are described in Mr. Schussler's testimony at page 810. Mr. Schussler describes the construction of this dam in detail at pp. 811-830. The whole San Andres system is described by Mr. Schussler in detail from pages 831 to 878. Photographs of the pipe line, tunnels and the like are shown in Exhibit 27, from pages 21 to 28.

Mr. Hering said of the San Andres system:

"The dam has been properly constructed, and I do not consider there was any extravagant feature in the dam. The structures and appliances for diverting and transporting water from San Andres reservoir to San Francisco were first class, and the entire work of the dam and the system seem to have been well done, and nothing appeared to have been improper or wasteful." (Hering's testimony, pp. 3421-3422.)

Mr. Hering also testified that the rainfall in the San Andres property watershed was greater than in San Francisco.

Mr. Stearns said of the system that he found the San Andres dam proper in design and of proper material, and did not find any evidence of extravagance in the construction of the dam or any of the appurtenances for conveying water to San Francisco. (Stearns' testimony, pp. 4242-4244.)

Mr. Schuyler testified that his statement with reference to Pilarcitos construction applied also to San Andres construction, namely, that he considered the construction under the somewhat unusual conditions and difficulties, not extravagant. (Schuyler's testimony, p. 5417.)

Mr. Adams testified that, in his opinion, this dam was properly constructed. (p. 4693.)

Reservoir in San Francisco at an elevation of about 165 feet by a conduit line consisting of three tunnels and a 44-inch wrought-iron pipe line. This 44-inch Crystal Springs pipe line crosses the swamp lands on the west side of the Bay of San Francisco on heavily piled bridges. It is 18 miles from the city.

By eventually raising the Crystal Springs dam to a height of 165 feet, its storage capacity will increase from 19,000 million gallons to about 30,000 million gallons, while should the dam be raised to its extreme practical height of 188 feet, which would also require a northerly extension of the main dam, the storage capacity would be increased to about 45,000 million gallons. (Schussler's testimony, p. 80.)

The above three reservoirs, viz: Pilarcitos, San Andres and Crystal Springs, each have side feeders through which water is brought into them from adjacent watersheds, and the entire water supply available for domestic purposes on the peninsula can be taken care of with comparatively small engineering cost. (Schussler's testimony, p. 537.)

The water product from these three reservoirs flows by gravitation from Pilarcitos, and from the others partly by gravitation and partly by pumping, to and into the respective distributing reservoirs in San Francisco. (Complainant's Exhibits 21, 22, 23, 24, 25 and 26.)*

* The Crystal Springs system is shown on the general maps of Complainant's properties, Complainant's Exhibits No. 3 and No. 20; its manner of connection with the city is shown on the profile map, Exhibit No. 22, which also shows its connection with the San Francisco reservoirs. The details of the map are shown in Complainant's Exhibit No. 43, and

Footnote, continued.

the blue prints, to-wit: Exhibit No. 44, the profile of the Upper Crystal Springs dam; Exhibit No. 45, the longitudinal section thereof; Exhibit No. 46, the cross section thereof; Exhibit No. 47, Lower Crystal Springs dam; Exhibit No. 48, profile of the Lower Crystal Springs dam; Exhibit No. 49, diagram of the outlet shaft and tunnel of the Lower Crystal Springs dam; Exhibits No. 49a, 49b, 49c and 49d are details of parts of the last described property; Exhibit No. 50 is a blue print of the longitudinal section of the Howard cut forming a part of the Crystal Springs dam; Exhibit No. 51 is a profile of the Crystal Springs 44-inch pipe line showing the various altitudes reached by this line; Exhibit No. 52 is a cross-section of the tunnel of the Crystal Springs system in Visitacion Valley; Exhibit No. 53 is an air valve of the Crystal Springs 44-inch pipe line.

Photographs of this system throughout its course of construction are shown in Exhibit No. 27 at pages 33-55. One very comprehensive picture of the dam as it exists today is shown at page 53, where the water is flowing over the dam. The Upper Crystal Springs dam is shown in Complainant's Exhibit No. 21 as located between the letters "R" and "I." The description of the dam and of the entire system and of the Crystal Springs Valley is given in detail in Mr. Schussler's testimony from pages 879 to 1010. The Upper Crystal Springs dam is described from pages 879 to 900; the Lower Crystal Springs dam is described at pages 901-954. The manner of the construction of the Lower Crystal Springs dam is shown in Photos 78 to 155 of Exhibit No. 27 and are explained by Mr. Schussler in his testimony at pages 957-977. The advantage of the Crystal Springs concrete construction is shown by Mr. Schussler at page 943. The upper dam was built before the lower dam and has been the subject of a great deal of discussion as to its value at the present time. As being at present useful Mr. Schussler testified concerning it (pp. 899-900):

"By the building of the Upper Crystal Springs dam we saved a large amount of money in postponing thereby the necessity of construction of the Lower Crystal Springs dam. We knew that the Lower Crystal Springs dam would involve an enormous outlay of money, and by building the Upper Crystal Springs dam first we could postpone the construction of the Lower Crystal Springs dam about ten years and save interest and taxes on the construction. Secondly, when we built the Lower Crystal Springs dam we naturally would flood all the county roads in the bottom of the valley, and, therefore, before the county deeded to us out and out the county roads in the valley that were to be so flooded, we had to build first-class county roads above the future high-water mark of the reservoir, which naturally led over the Upper Crystal Springs dam so as to connect the two sides—the westerly or coast portion of the county with the easterly or bay portion of the county. Finally, as I illustrated a little while ago, we make very good use of the dam as a settler, because when we only had the Crystal Springs upper reservoir the only objection made at that time to that was that the water was muddy for so many months in the year, and it

Footnote, continued.

caused a great deal of annoyance to the citizens of this city directly, and also to us. By maintaining this dam as an absolute division of the two waters, we prevent the muddy water which comes during the big freshets into the upper lake and riles up the water—I say, we prevent that muddy water from communicating with the clear water in the reservoir, the water in the lower reservoir being fed by streams that are washed down largely either to bedrock, cobbles or gravel, and the water thus has a much clearer course and it comes into the reservoir in a much clearer state; the hills are more wooded, and therefore the earth is held back better than in the watershed of the upper reservoir.”

Mr. Hering testified concerning Upper Crystal Springs dam:

“I observed that more than usual attention had been given to planning the works as far ahead as seemed practicable, but building from time to time only such works as would guarantee a supply for as short a time in advance as seemed necessary for the purpose of not investing money unnecessarily. In connection herewith, however, I also noticed that such works as could be most expediently built at a certain time, as, for instance, in the case of the Crystal Springs dam extension, had been built in advance, and that such property as would be necessary in the future had been secured at the earliest possible time.” (p. 3432.)

“I thought the dam was built economically and properly. I neither saw anything faulty in the design nor anything which indicated an extravagant expenditure in its construction.”

“The dam is now useful in being able to retain the first flow of water from the surface after a rainstorm, which flow generally carries with it earthy and vegetable matter in suspension, particularly from the upper ends of the valley. It thus acts as a settling basin and thereby assists in furnishing the main reservoir with better water than would otherwise be possible; in fact, it is in some cases customary to build such settling reservoirs prior to the water gathering into, for instance, filter basins or reservoirs from which the distribution is taken directly. When I examined these reservoirs I noticed that the water in the upper reservoir was less clear than in the lower one, and the character of the watershed, as I could see it, satisfactorily explained that condition to me. . . . I think it may be properly counted an asset in the corporate property of the company.” (Hering’s testimony, pp. 3423-3424.)

Mr. Adams testified: (p. 4747.)

The Upper Crystal Springs dam, as I have already pointed out, is useful for clarification of the water by sedimentation after storms, as a crossing for a county road and in securing safety to at least a part of the water of the lake should accidents to the lower dam render necessary the drawing off of the waters of the Lower Crystal Springs Reservoir.”

Footnote, continued.

Mr. Hering also testified on cross examination:

That he considered that it retains the water coming from the upper end, and therefore acts as a means of settling suspended matter and making the lower lake's water clear; and that he had noticed a decided difference in the condition of the water that existed in the Crystal Springs lake above and below the upper dam. (p. 3650.)

Also:

"We construct our decanting reservoirs in that manner. For instance, for sewage purposes we put in a submerged dam and let a small amount of water flow over so as to allow the suspended matter to deposit, and the clear water of the top flows over this dam; nothing at the bottom flows through it. . . . I have known of other cases where there is a submerged dam in the middle of a reservoir. I have seen a number of them." (p. 3651.)

Mr. Stearns testified: (p. 4471.)

"I think it is an advantage to have the separation. . . . The water is not so quickly forced from above the dam to a point below the dam. . . . The winds would make a quicker circulation from the upper to the lower end if the dam were not there. . . . If the upper dam were not there the sediment would not be deposited to the same extent it is now."

Also, Mr. Schuyler testified: (pp. 5419-20.)

"The upper dam made for a number of years a very material saving in capital outlay and interest and the general maintenance cost by reason of the fact that the supply was for a time sufficiently provided by the construction of this Upper Crystal Springs earth dam. At the present time it serves two useful purposes: First, as a highway leading from San Mateo to Halfmoon Bay, which formerly passed up the valley, thus saving the construction of a roadway around the extreme end of a very long lake, thereby greatly increasing its distance and inconvenience to the public, and besides this, the dam created a settling basin for the one branch of the San Mateo Creek which is subject to a considerable amount of sediment during the rainy season. It further acts as a purifier."

Mr. Schussler testified: (p. 294.)

"From the 47-foot level we continue the reservoir capacity jointly (lower and upper dam), though during the rainy season, when the water is muddy in the upper lake and much clearer in the lower lake, we keep the gates shut in the outlet tunnel of the upper dam, so as to allow the water in the upper reservoir several months' time to settle. If we did not do that, the very riley water accumulated during the storms in the upper reservoir would at once mix with the much clearer water in the lower reservoir and also make it riley and slightly objectionable to the people. Therefore, by this system

The lower Crystal Springs dam has also been the subject of a great deal of comment because of the fact that it is built thicker at the base than would be required for a dam of its present height. This was done in order to permit the dam to be raised whenever the necessity for storage requires.

Mr. Schussler testified (p. 80):

"It was built with the view of increasing its capacity from the present capacity of about 19,000,000,000 gallons to about 30,000,000,000 gallons by building on top of the dam about 25 feet more. It was constructed with that object in view."

Mr. Schuyler testified:

"In every case I should prefer to carry the structure up on the lines of its ultimate completion as a homogeneous monolithic mass." (p. 5423.)

b. ALAMEDA SYSTEM.

The Alameda Creek system consists of 600 square miles of watershed immediately back of the town of Sunol and ranging south almost to San Jose, which includes 140 square miles tributary to Calaveras Creek, thirty-seven square miles tributary to the Arroyo Valle, and forty square miles tributary to the San Antonio Creek. (Schussler's testimony p. 77.) The run-off from these creeks as well as that from the artesian wells at Pleasanton is all carried practically

Footnote, continued.

of closing the gates in the upper dam outlet, we succeed in keeping a constant supply of very clear water to flow into the city from the lower reservoir alone. We do not open the outlet from the upper to the lower until later on in the summer, when the settlement of the sediment in the upper lake has completed itself and clarified itself."

to an underground dam built on the bedrock in Sunol Canyon which has been filled in by nature with gravel to the extent of about 1400 acres; in these gravel beds a long cement tunnel has been built for over 14,000 feet in order to catch the water coming from this watershed after it has been filtered through this natural filter bed, and thereby San Francisco gets an average of over 14 million gallons daily, running up to as high as 17 million gallons on individual days. This water is carried from the filter bed to the Niles Screen House and from there to Dumbarton Point, on the easterly shore of San Francisco Bay, and thence by means of submarine pipes under San Francisco Bay between Dumbarton Point and Ravenswood on the westerly shore of San Francisco Bay to the Belmont Pumps.

This Alameda Creek system has no storage reservoirs as yet, although the Sunol Valley gravel beds and the Pleasanton artesian wells practically constitute subterranean lakes for water storage. (Schussler's testimony p. 222.) However, the Calaveras dam has had all excavations and experiments made to demonstrate its capacity, and it will be able to hold the waters of Calaveras Creek in excess of 30,000 million gallons. (Schussler's testimony p. 298.) The capacity of the San Antonio dam has been similarly demonstrated (p. 300) and it will hold in excess of 9,627 million gallons (pp. 299-300). These last two dams with a subsidiary dam on the Arroyo Valle, the site for which has already been developed, will give a future storage capacity of from 45,000 to 50,000 million gallons.

The present average supply drawn from the Alameda Creek system consists of about 15,000,000 gallons per day drawn from these subterranean lakes fed by the creeks on land owned by the Company, and gravel beds, and from artesian wells.*

By developing the Calaveras portion of the Alameda Creek system, as proposed, complainant will have a storage capacity of 30,000 million gallons at an elevation of about 750 feet above tide, which will gather and store the water product of its direct and immediate adjacent watershed of 140 square miles. Making allowance for evaporation the daily average net product of water of this reservoir will be, in round numbers, about 30 million gallons a day, year in and year out. (p. 298.)

Similarly, by developing San Antonio and Arroyo Valle reservoirs having a joint watershed of about 180 square miles, this system could be made to produce an additional supply in the neighborhood of 20 million gallons per day. (p. 623.)

The Alameda Creek system, *when fully developed*, can be brought up to furnishing a total supply of 90 million gallons per day. (p. 285.) The present water product of 15 million gallons per day, is con-

*The location of these various streams named and the area of the watershed will be seen from Complainant's Exhibit 12, and an explanation thereof is given in Mr. Schussler's testimony from pages 320 to 326. The run-off or water yield from these various pieces of property, including the Alameda system, is shown graphically in Complainant's Exhibit No. 7, and the description thereof is given in Mr. Schussler's testimony, pp. 186-197. Complainant's Exhibits 1 and 5 show the growth of consumption of water and the rate at which San Francisco's consumption increased. The diagram, Complainant's Exhibit 5, is explained in Mr. Schussler's testimony. (pp. 157-169.)

veyed westwardly through the Sunol aqueduct by means of concrete-lined tunnels having a capacity of from 70 to 75 million gallons daily, and of stretches of heavy redwood flumes from tunnel to tunnel of a present carrying capacity of 30 million per day.*

This water is carried to the concrete receiving basin at Niles (known as the Niles Screen House) at an elevation of 180 feet above tide, and is from there conveyed in a southwesterly direction through a 36-inch wrought-iron pipe, buried in the ground, passing the towns of Centerville and Newark, until about one mile west of Newark the pipe reaches a strongly piled bridge, on which it is carried for a distance of 16,000 feet to Dumbarton Point. This bridge carries it across the swamp lands on the east side of the Bay of San Francisco.†

The Bay of San Francisco is crossed by four ball-joint submarine pipe-lines of the same respective dimensions and age of service as those in the slough hereafter mentioned, that is to say, two 16-inch and two 22-inch pipe, the 16-inch being in service since 1888, and the 22-inch since 1902. The distance between Dumbarton Point and Ravenswood is 6300 feet. Prior to reaching Dumbarton Point similar submarine pipes carry the water under a navigable slough 300 feet wide.

* This is shown on the photograph of Relief Map, Complainant's Exhibit 12, and by profile map Exhibit 22, and is explained in Mr. Schussler's testimony. (pp. 321-327.)

† Parcel number 3 of Complainant's Exhibit No. 7 is a map of the Alameda Creek properties showing the percentage of run-off water and the aggregate storage in the Alameda property. This is all described in Mr. Schussler's testimony, pp. 204-208.

At Ravenswood the four submarine pipe lines merge into one 36-inch wrought-iron pipe. This pipe runs 2000 feet along a heavily piled trestle through the swamp lands on the west side of the Bay until it enters terra firma, being riveted together in a trench about six feet in depth. Thence the 36-inch wrought-iron pipe runs partly under public roads and partly through private rights of way, to the receiving reservoir at the Belmont Pumping Station, which reservoir is about twelve feet above tide.

The Belmont pumping plant is in five units, and has a capacity of lift of 23 million gallons a day to an elevation of 325 feet, to a standpipe erected on a hill to the southwest of the pumping station. From this standpipe the Alameda water, so pumped, again enters a 36-inch wrought-iron pipe, which carries it in a northwesterly direction through the town of San Mateo, to its junction with the Crystal Springs 44-inch pipe near Burlingame. At the same point this 36-inch pipe also joins the new 54-inch pipe which carries the Alameda water to Millbrae pumping station.

This pumping plant, as well as all others, was described in detail by Mechanical Engineer Eckart (pp. 5710-5750), and his testimony is crystallized in complainant's exhibits 117, 118 and 119.

As will be seen elsewhere, all engineers admit that the difficulty of supplying water to San Francisco is unique from a physical standpoint. Because of the Civil War, shortly after the complainant started its existence, and because of various other public disturbances, including the Denis Kearny's "workingmen's

movement," there were grave doubts as to California's ultimate growth between the years 1865 and 1880. Nevertheless complainant gradually built and expanded its water system. Spring Valley developed all the nearby sources to San Francisco. It interlocked them in such a way that no matter how terrible the calamity should befall San Francisco, it would by a few changes in a short time be able to so reinforce the disabled part as not to disturb the continuity of supply. The manner of the various steps by which these two systems in Alameda and San Mateo have been developed and united, and the manner in which the conduit systems therefrom have been interlaced and connected with each other and with the city reservoirs and distributing systems in the various parts of the city, has been shown very fully by Mr. Schussler in his testimony.*

* Concerning the difficulty of the situation and the manner in which it is met, Mr. Schussler testified: (pp. 47-77.)

"If the Spring Valley Water Works, even with its proximity to the city, had only one pipe line leading the water into the city, and the city with its present demand of over 30,000,000 gallons a day, and that one pipe line should break, there would be danger of interruption, and you would then only have to fall back on the small storage in the city reservoirs. If, on the other hand, you have two, three or more pipe lines from the various and different sources, you not only have the security, in case one of the conduit lines gives out, that the others can be turned into use, but you also have another very important advantage, which is, if, through accident, or through the fault of a dry season, one of the several sources has not received its proper average quota from the rainfall, that then you can utilize the other portion of the works which has had a more abundant supply, and in this manner you can complement the one from the other, making the sum total of water which arrives in the city daily a constant factor.

"The lower part or business portion of the city is what we call 'the lower system,' and is supplied from the Crystal Springs reservoir and Alameda Creek combined. The Crystal Springs reservoir is a reservoir formed by the building of a large concrete dam in

Footnote, continued.

the Crystal Springs Valley, for the present, up to a height of 280 feet above tide. Its capacity, in round numbers, is about 19,000 million gallons. From this reservoir a 44-inch wrought iron pipe runs into the University Mound reservoir in South San Francisco, being interrupted by two tunnels. In one tunnel there is a pipe led through it and built in the masonry, and in the other tunnel the water runs freely by gravitation in the brickwork of the tunnel. In this manner the water arrives by gravitation into the University Mound reservoir, which is located, as I said before, in South San Francisco, at an elevation of about 170 or 175 feet above tide, and of a capacity in the neighborhood of 33,000,000 gallons. From this reservoir a pipe and tunnel line starting at the reservoir, 44 inches in diameter, crosses first Islais Creek Valley on a bridge, and then through Bernal Heights, south of the Mission by a tunnel, in which tunnel also a 44-inch pipe is built solidly into the masonry, so as to carry the water through it under the pressure from the reservoir. That tunnel being located somewhat lower than the bottom of the reservoir, the entire reservoir can be emptied through the 44-inch pipe and through the tunnel into the town. At the north end, or outlet end of this tunnel, the pipe reduces to a 37-inch pipe and goes down Harrison street and gradually works into Howard street, reducing on its way, as it has given off sideways branch pipes of cast iron of various sizes, varying from 12 to 16 inches; these side pipes or branch pipes supply the city, approximately through the middle of which this main artery that I have first described passes. By the time the pipe has arrived at Howard street it has given off so much of its original capacity in the shape of water that we have reduced the size of it there to 30 inches, and after its coming to Howard and Second streets it is reduced still further to either 22 or 24 inches, and then follows along the lower business portion of the city in a northerly direction through Montgomery avenue and to North Beach, and has its final exit into the bottom of what we call the Francisco Street Reservoir, which is located here at North Beach, at an elevation of about 140 feet above tide. In this manner the lower business portion of the city is supplied by water as the pipe passes through it, and at the same time the pipe leading into the North Beach Reservoir, or the Francisco Street Reservoir, as we call it, has a chance to discharge its night water, when there is less water drawn during the night, into this North Beach Reservoir and accumulate it there for the next day. The district so supplied from the Crystal Springs and Alameda Creek is approximately bounded or described as follows: It is the district located north of Bernal Heights, which lies south of the Mission, east of Valencia street, with the exception of the higher portion of Potrero Heights, south of Market street, and it includes a small triangle surrounding the City Hall north of Market street; thence down along Market street to the water front; thence east of Montgomery street, and finally it ends up at North Beach and butts up against the Government reserve at the Presidio. This

Footnote, continued.

Crystal Springs district, or Crystal Springs supply, is supplemented by a supply which we draw from Alameda Creek. This water is drawn from two filter beds, or gravel beds, one located in Sunol Valley, near the little village of Sunol, and the other located in Pleasanton Valley, near the town of Pleasanton. The water from the neighborhood of Pleasanton is drawn through artesian wells, flowing through a timbered gallery, through a lot of pipes, down the creek for the present, and it runs down Laguna Creek to a point about a mile or a mile and a half north of Sunol. We have purchased the right of way, or acquired it, for the purpose of taking the water out of this creek as soon as we can afford it, so that from our Pleasanton ranch, instead of its running down the bed of the creek, it will be run in a pipe line or other aqueduct independently of the creek bed, and it will run onto and into the Sunol Valley filter beds; but for the present, as I say, we take the water out of Laguna Creek about a mile and a half north of Sunol, and by a separate conduit consisting of a canal, ditch, concrete tunnel and flume, we lead the water on to what we call the Sunol Home Ranch; that is a large tract of land that we purchased in fee simple a number of years ago for the purpose of absolutely controlling the purity and maintaining the purity of the water. We lead this water on to a big gravel bottom in the valley which we own, and from which every pollution whatever is kept off, and the water sinks into the gravel, which is of variable depth, and underlying it there is a bed of stiff blue clay, and some stiff blue clay mixed with tight gravel. The water sinks into this gravel, and if there was any impurity in it whatsoever, it would be all taken out by this natural filter system, as the analyses, both chemical and bacteriological, have proved. The water coming from the south, namely, from our Calaveras properties, and from the San Antonio Creek properties, which we own also, largely sinks. The San Antonio Creek in the summer sinks entirely; the Calaveras Creek runs over the surface for some time during the spring and summer, but later in the summer it nearly all sinks and joins subterraneously the water that has been brought from the north, namely, from the Laguna Ranch, or Pleasanton Ranch, on the ground; they all join together on the Sunol Home Ranch in the gravel bed which we own. In order to draw the water off from this subterranean gravel bed, which not only acts as a filter bed, but also as a storage reservoir of all water on the ground from where it cannot escape, because we own the outlet of the valley and on it have a bedrock dam made of concrete, so that all of the water so sunk has got to come either over the dam or through the filter tunnel that we have constructed through the bottom of this valley with several branches, partly of timber, and in the deeper portions of concrete; this filtered water is drawn from this concrete channel by means of gates and gate-houses—big iron gates, brass-faced, so that they cannot rust, and they can be shut off entirely or partly opened, and as much as we need or require

Footnote, continued.

day by day can be drawn from this storage or filtered water. We are drawing from there now in the neighborhood of 16,000,000 gallons a day of filtered water. The average for last year, that is, for the calendar year 1903, was somewhat over 14,000,000 gallons a day. This water is then conducted through a massive conduit leading from the Sunol Valley or dam, through a system of tunnels or flumes—a conduit consisting of tunnels and flumes—until it finally arrives at a place called Niles—Niles Station—and there it arrives from out of a long tunnel underground, cool, clear and sparkling, in a large concrete filter basin or screen basin, screen house; the screens are put in there purposely in case, in the passage of the water, there should have been any little leaves or little floatage of that kind got into the flume, although the flume is tightly battened, those screens will prevent such little floatage getting into our pipe, and eventually into the submarine pipe, which must be kept absolutely clear at all hazards. From this screen house a 36-inch wrought-iron pipe leads in a westerly direction past the towns of Niles, Centerville, Newark, until it arrives at the easterly edge of the salt marsh which lies on the east side of the Bay of San Francisco, not very far west of the town of Newark, where the pipe from the screen house at Niles to near the marsh has been buried underground in a ditch, and the moment we get to the marsh it rises up on a trestle bridge which is built by driving piles across the marsh and building a substantial timber trestle on it and a bridge, and on the bridge laying the iron pipe, and riveting it together and then again casing in the pipe with a timber casing, so as to keep the sun off from the pipe and thus keep the water cool, and at the same time keep the expansion and contraction influence away from the pipe, that would or might injure the pipe in case it was not covered, and particularly if ever the pipe has to be emptied for the purpose of repairs. In this manner, on this bridge the pipe is carried until we come to a slough or river which is about 300 feet wide, and that river is crossed by four submarine pipes which dip under the river and out of it again so as not to obstruct the navigation of this river; the slough is from 15 to 25 feet deep, and vessels go right over the pipe. The two submarine pipes—the first two that were laid—were 16 inches in diameter, ball joint, flexible joint, and the second two pipes are 22 inches in diameter, also ball joint. They are joined at either shore by a very carefully constructed shore landing piece, with air chambers, concussion chambers, safety valves, blow-offs, and so forth. Where these four submarine pipes emerge again from under the slough or river on its westerly shore, they are again joined together in a house, built for the purpose, into one 36-inch wrought-iron pipe, again on to the bridge which runs some 7000 feet over the marsh, until this bridge reaches the easterly shore of the Bay of San Francisco at a place called Dumbarton Point, which point is opposite to the narrowest part of the Bay of San Francisco, the bay widening out from that point to the north and to the south.

Footnote, continued.

From this Dumbarton Point, again the pipes spread out into four submarine pipes, each one treated as an individual, each one with its own shut-off gates and blow-offs, so that any one of the four pipes can be put out of use, looked after, repaired, blown off, and so forth, so that the incapacitating of one does not injure the whole. The four submarine pipes across the Bay of San Francisco—or the first two that were laid in November, 1887—they are 16 inches in diameter, that is, they are called 16 inches in diameter, but the net inside diameter is a little bit less, but they are what we call 16-inch, lap-welded tubing; the third and fourth pipes are 22 inches in diameter, both of them flexible joints, ball joints, at about every 20 feet. These pipes crossing the bay are in the neighborhood of 6000 or 6300 feet in length each. As soon as the pipe arrives at the westerly side of the bay, they are again joined together, by a very careful and well-constructed arrangement, into one 36-inch pipe, each pipe again having its shut-off and blow-off gates. Meanwhile, where the pipe lies across the bay, the vessels in their passage are in no manner disturbed, as the water through which the pipes pass is something like 8 or 8½ fathoms deep, in the deep channel of the bay, which deep channel lies nearest to the easterly shore; the westerly portion of the bay is shallower. After these pipes have been joined together again on the westerly shore at a place called Ravenswood, they again rise up on a trestlework in the form of a 36-inch wrought-iron pipe; they run for about 2000 feet on a bridge through this marsh, so as to keep the influence of the salt and other chemicals that are in the marsh away from the iron, and thus keep it from rusting, and besides, being on the trestle, the pipe is constantly subjected to inspection, painting, and so on. From the point where the westerly edge of this Ravenswood salt marsh is reached and good first-class terra firma is reached, the pipe again dips under the ground and follows through Menlo Park, Redwood City, to a point about half a mile south of Belmont Station, at which point we have a pumping station called the Belmont pumping station. At that point the water empties into a reservoir which is located about 15 or 16 feet above tide, thus giving up the head as the difference between the elevation of this Belmont reservoir and the reservoir near Niles, which is about 185 feet above tide, giving us a net difference of about 170 feet to act as the pressure to force the water from Niles through all this immense length of pipe into the reservoir at Belmont. From this reservoir, the water is taken by five pumping plants, which are all embodied together in one large building, the original plant having been two pumping plants of 5,500,000 gallons capacity each; they were built in the year 1887-88, and completed about the latter part of the summer of 1888, and have been running ever since, each one of them of a capacity of 5,500,000 gallons a day, or a joint capacity of 11,000,000 gallons a day. As we saw the necessity of increasing the supply from the Alameda Creek region, we not only, a few years ago, added the third and fourth subma-

Footnote, continued.

rines pipes to the slough and bay crossing, but we also began to construct an additional pumping plant at Belmont, and we did that by adopting, instead of two units as heretofore, three units in the new plant of 4,000,000 gallons each. We also replaced the old boilers that had been there before with new ones, and we added more new boilers to it, so that we now have five pumping plants, two of which represent a daily capacity of 11,000,000 gallons, and three new ones a daily capacity of 12,000,000 gallons, or a total capacity for the five pumping plants of 23,000,000 gallons. The boilers consist of six Babcock & Wilcox boilers. The water is led from the reservoirs into a little screen chamber, first, by a 36-inch pipe, and afterwards by a concrete conduit to the various pumping stations, and each pumping station having its little ante-chamber or suction-well, each one with a shut-off gate. Each one of the pumping plants can thus be isolated and disconnected from all the rest. The division of the capacities of the various pumps makes the station quite flexible, so that whatever amount of water is required within the amount that comes over from Alameda Creek can be pumped by either one, two, three or four of the pumping stations. Four are actually all that are necessary, even by running one or two a little bit slower, but, as I stated this morning, the supply of a big city like this with a positive demand—it has to be here, and we cannot afford to run the risk of not having any relay, so we constructed the fifth pumping plant as a safety factor, and we also had an extra boiler put up in case of necessity, if any one of them should ever get out of repair. The water that is thus drawn from this Belmont reservoir by any number of these pumps is forced through a force-pipe into the base of a tower which is built in the rear of the pumping station and on top of a hill, and the top of it is open and reaches to a height of about 330 feet above tide. From the base of the same tower, on the other side, the 36-inch pipe issues, goes down the hill in an easterly direction to the county road, and runs from there along the county road in a northerly direction, until it comes to a place called Burlingame, about a mile and a half north of San Mateo, where it is joined with the heretofore described 44-inch pipe, which comes from Crystal Springs, by a big 36-inch gate. In addition to this pipe, this junction, we have, within the last few years, laid the new pipe, what we call the new Alameda 54-inch pipe, from this same Burlingame junction to the Millbrae pumping plant, which enables us to get the independent water from Alameda Creek directly to the Millbrae pumping plant, which lies about half a mile north of Millbrae station, and send it up to the San Andres outlet tunnel, so as to come to its relief in case of a scarcity of supply there. We also have, at the outlet of the San Andres reservoir tunnel, which I shall describe hereafter, a pumping station which can pump this water up to the top of the hill into the Pilcarcitos pipe line, which runs from the highest San Mateo reservoir, called the Pilarcitos

Footnote, continued.

reservoir, straight into San Francisco, into the reservoir which is located near the Almshouse, and supplies the Western Addition. But now, to go back to the junction of these waters, that is, the Crystal Springs water coming from Crystal Springs through a 44-inch pipe, to the junction pipe at Burlingame, and the Alameda water coming from Alameda Creek, from Sunol, and so forth, underneath the bay to Belmont, arriving there at 14 or 15 feet above tide, and from there it is pumped to an elevation which meets the pressure at either Burlingame or Millbrae, so that after the junction with the Crystal Springs water, it can run by gravitation into San Francisco and into the University Mound reservoir that I have heretofore described, located in the southern portion of San Francisco. That is one of the portions that I speak of as an interchangeable proposition. We have, in other words, an independent supply from Alameda Creek, which can be let on and turned in and is now being used and sent to town, or we can shut it off and turn in the same amount of water from Crystal Springs, or more, or we can take a portion of one and a portion of the other. The plan is that this new piece of pipe, which we call the Alameda 54-inch pipe, which is laid now only for a distance of a little over three miles, from Burlingame, to the Millbrae plant, will be extended in the near future clear through into the Lake Merced ranch, where our great main central pumping stations are going to be located. This now takes care of the water supply of this business part of the city that I have described heretofore, namely, east of Valencia, south of Market, east of Montgomery, to the North Beach region.

"Now, then, the next stage: The next elevation is what we call the San Andres or College Hill district. A few miles north of Crystal Springs reservoir, in San Mateo County, there is located the San Andres reservoir, the construction of which I commenced in the latter part of the sixties, and finished in the early seventies. That reservoir has a capacity of about 5,500,000,000 gallons, perhaps a little more, and is located at an elevation of 450 feet, in round numbers, above tide. That reservoir receives its supply from its own direct water-shed, the mountains leading into it, nearly all of which we own; within the month we purchased another ranch in the water-shed, the Ashton ranch, of about 150 acres; that is in addition to other properties which we have, and we have a very large tract of land there. The water, as I said, gets its supply partly from the direct watershed, partly from the upper portion of San Mateo Creek, which we have connected with the San Andres reservoir by a tunnel called the Davis tunnel, and a flume line, so that this upper district of a little over a square mile of land, which formerly ran down into the Crystal Springs reservoir, now is saved at the higher elevation at San Andres, which saves us the cost of pumping we would have had to go to in case we let it run down to the low level of Crystal Springs. And finally we have what we call the Locks Creek aqueduct, which consists of the

Footnote, continued.

lower Pilarcitos Creek, which I will describe hereafter, and the San Mateo Creek, and they for the present are the feeders. The water is fed by a long line of tunnels and flumes, called the Locks Creek aqueduct, by gravitation into the San Andres reservoir, preserving it there at the 450-foot level instead of allowing it either to go to the sea or to turn to the lower level of Crystal Springs. We also own extensive water rights and rights-of-way and an old aqueduct line called the Locks Creek and Apanolio Creek line, which we propose to repair as soon as we can afford it; it needs some little expenditure of money, of which we have been somewhat scarce lately; that again will be re-added to the Locks Creek system, thus increasing the output of water from this tributary watershed into San Andres. The outlet of San Andres reservoir toward the city consists of brick and a concrete shaft and tunnel, called the Bald Hill tunnel, and it is lined with brick, and has regulating gates at its inlet, and as the water exits from this tunnel, which is at an elevation of about 370 feet above tide, and which tunnel lies almost due west of Millbrae station, only at about 370 feet above tide, there the water runs into a screen house, where the water is thoroughly screened through wire and cotton cloth screening, and then allowed to enter the 44-inch pipe which we call the San Andres pipe line, which pipe goes down the hill in an easterly direction to the county road, near the Millbrae pumping station, and then follows along the county road until it comes to Baden station of Twelve Mile farm, where it reduces to a 37-inch pipe for a short distance, where it goes over a swamp on a trestle, and at the north end of that trestle it reduces to a 30-inch pipe, and runs from there as a 30-inch pipe, over the hills, past Ocean View town or station and into the College Hill reservoir, which lies in the southerly portion of the Mission, at an elevation of about 250 feet above tide, and of a storage capacity of about 14,000,000 or 15,000,000 gallons. Before the water enters this College Hill reservoir, it passes through an aerating process, so as to give the water which has been stored in the San Andres reservoir and drawn within about 20 feet of its bottom, a chance to come in contact with the atmospheric air, and it dashes and splashes over a system of flumes and dashboards so as to get thoroughly exposed to the air and to the wind, and it has quite a freshening effect upon the water; thereupon it is allowed to run into the College Hill reservoir. As I stated before, what we call the Pilarcitos pumping plant, which is located at the outlet of this San Andres tunnel, also receives its water from this San Andres tunnel outlet, or, if we choose, from the Millbrae pump, which has pumped it up from either Crystal Springs or from Alameda Creek, or from both. The system is so devised that, no matter which portion is disabled or gets out of order, the stream that arrives in San Francisco is constant, and the people in San Francisco never know—I have run these works now for thirty-nine years and ten months, and there never has been an interruption in the supply, to my knowledge, of one month,

Footnote, continued.

one day, or one hour, and it is the very fact of the interchangeability that has made them reliable as to the constancy of the supply. In order to illustrate the absolutely necessity of constancy and reliability, all I have to do is to call your attention to the fact that this is probably one of the most combustible of all the large cities in the United States; it is exposed to the winds, and if ever a fire should start on one of the slopes pitching towards the west or northwest during a heavy blow, if it was not for this interchangeability and reliability and aptitude to get water everywhere and anywhere under a big pressure, you would have seen this town burned up a dozen times, in spite of a good Fire Department, which we have; they must have water, and they must have it everywhere, and all the time, in order to cope with a conflagration. Now, that takes care of what we call the second story of our supply system, or distributing system. We call it the College Hill district. It is represented by the district lying west of Valencia Street and butting up against the Mission foothills, north of Market Street, east of Montgomery Street, up to Dupont, and then running in north to North Beach, and it ends here somewhere in the neighborhood of Montgomery Avenue. The College Hill reservoir being at 250 feet above tide, and allowing for variable loss of head during the hot and cold days, the water arrives here in town with a pressure or elevation running anywhere between hot and cold days from 180 to 215 or 220 feet above tide.

"The next story of our supply is what we call the Western Addition supply. That is derived primarily from San Mateo County, from what we call the Pilarcitos system, which is an entirely independent system, but we have connected also with all the other systems in this town, and also out in the country, so that we can blow off surplus water from the higher Pilarcitos systems into the lower San Andres or Crystal Springs systems, not only in the country, but also in the city, and we can also assist in the upper system in this city from any one of the lower systems by pumping stations located at the proper places. That again completes that chain of interchangeability. A short description of the Pilarcitos system would be about as follows: In the mountains in San Mateo County lying westwardly from Crystal Springs and San Andres reservoirs, there lies a system of valleys called the Pilarcitos valleys, and there, at a point of junction between two creeks, we built a reservoir called the Pilarcitos reservoir, at an elevation of nearly 700 feet above tide. The water from its own water-shed, which we own entirely or almost entirely—I do not think there is hardly anything we do not own—runs by gravitation into this reservoir. To it is added water from adjoining mountains by a flume, which we call the side flume, which leads a couple of miles along hills through the woods; all the woods we preserve, and we have a big forest there, and the timber is not allowed to be cut, so as to keep the springs running and fresh in the summer. This water is led from

Footnote, continued.

side creeks into the Pilarcitos reservoir, and from it through a tunnel, which is lined with masonry. It is drawn into what we call the San Mateo Valley, led across the valley by a short flume, and it enters the second tunnel, which we call tunnel No. 2, and which is about 3420 feet long, also brick lined, until the exit or outlet of the tunnel appears on the westerly side of the Crystal Springs Valley. There the water is caught up by a conduit line, consisting of a large flume and 44-inch pipe for some little distance, until it reaches a prominent point at an elevation of somewhere about 640 feet above tide on the westerly side of the Crystal Springs Valley. From this point what we call the Pilarcitos pipe line starts in, and it starts in 30 inches diameter, but in portions of it there are insertions of 24-inch cast-iron and 22-inch wrought-iron pipes, but, generally speaking, it runs 30 inches in diameter all the way through San Mateo County, along this ridge which lies east of the San Andreas Valley or reservoir and west of Millbrae station, and this is the pipe that I referred to a while ago that into it the water can be pumped by the little Pilarcitos pumping station at the outlet of San Andreas tunnel either from the San Andreas reservoir into the Pilarcitos pipe line, or from Crystal Springs or Alameda pipe line at the Millbrae pumping station, first to the Pilarcitos pumps, and then up the hill so as to be re-enforced from it. We have to do that in case of a break in the main line from Pilarcitos, so as to keep up a constant supply into San Francisco. This pipe continues 30 inches in diameter quite a number of miles, passing west of the 12-mile station, past Colma, then it goes through Ocean View, and then it follows in a northerly direction over the hills which lie south of the Ingleside race-track, and it dips over that country just to the east of the Ingleside race-track, and raises up again into the hills which are called the Sutro Forest, where we have a right-of-way from the former owners of the Sutro properties, Pioche and Bayerke, and we have a large flume leading from there, intercepted by a small piece of 30-inch pipe, into what we call the Lake Honda tunnel. That is a brick tunnel 2820 feet long, running through the hills near the Almshouse and to the south of it. At the outlet or northerly end of this Lake Honda tunnel, there is what we call a screen house, in which this water is screened through wire and cotton cloth very thoroughly before it is allowed to enter the 30-inch pipe which leads to San Francisco direct, as to one pipe, and the other pipe leads to San Francisco direct, with a blow-off into the Lake Honda reservoir—an outlet, so to speak. The Lake Honda reservoir is quite a large reservoir built in the hills near the Almshouse; it is built of masonry, and holds about 33,000,000 gallons of water. From it a tunnel and outlet pipe is constructed with a double forebay or gate-house, and the pipes issue from the gate-house and again join the pipes that have gone past Lake Honda reservoir on their way to town, so that we can draw the water either directly as it comes

Footnote, continued.

freshly in from the country, or, after having been put in the reservoir, wholly from it, or from both; at the same time I have an automatic arrangement at this point of juncture in the gate-house which, in case there is more water coming in to town than is used during that hour or minute or day, this gate shuts itself and the further pressure goes on to the city directly from the country, from the tunnel from the screen house which I have just described, which is about 20 feet higher than the lake, and it gives the city the benefit of that extra pressure. Should, perchance, a great conflagration occur, and the draught on these pipes and on those that exit from the reservoir should be so great as to be more than happens to be coming from the country, then these large self-acting gates open themselves—they are balanced and adjusted—and let the entire capacity of the tunnel and pipe automatically onto the city, night or day or any minute, so that that is a splendid system of fire protection by itself. The water, after flowing out of this Lake Honda reservoir, goes first in a northerly direction, and then in a northeasterly direction, and finally it strikes the country south of the Park, comes along Frederick Street and Haight Street and Oak Street, and finally dwindles down from the 30-inch pipe to one 22-inch pipe and one 24-inch pipe; they come down almost parallel to each other, one on Haight Street and one on Oak. The Haight Street pipe, being 22 inches, goes as far as Devisadero Street, and then swings along to the north on Devisadero Street to Clay Street, and then along Clay Street to the summit of Lafayette hill, or what is called Observatory hill. The other branch is a 24-inch pipe, and comes down Oak Street and goes to Scott and Bush, and finally along Steiner Street to Pacific, and on the way down crosses the town, running along in a northerly direction, and it connects again with all the big cross pipes which feed easterly into the boarding-house district, which is the great danger district in this city—the tall buildings of wood—and they get their supply pressure not only from the 22-inch pipe which lies on Devisadero Street, but also re-enforced and also connected, with the gates all open, with the 24-inch pipe on Scott Street and Steiner Street, and so on, and finally the butt end of that Scott Street 24-inch pipe ending at Pacific Street. It there connects with the big mains on Pacific Street, and we have lately extended the main eastwardly on Pacific Street—another 16-inch main—so as to give that country a good, big fire pressure. That approximately gives an idea of what we call the third story of our supply, which is the entire Western Addition, even including the Richmond District and a large new district now building up rapidly south of the Park.

“There is another district, which lies higher than all of these districts just described, and which cannot be reached by our gravitation means—that is what we call Pacific Heights, the long, sharp ridge along the North Beach country, and you might say that Washington Street is the center line of the summit, and it stretches

Footnote, continued.

a long way toward the west. That water is drawn by the Black Point pumping station, which lies here at North Beach, adjoining Van Ness Avenue, near Fort Mason, and which pumping station draws its water from the Crystal Springs and Alameda lower system, and indirectly out of the Francisco Street reservoir that I described first; it takes its water from that reservoir. This Black Point pumping station has a capacity for about 3,000,000 gallons double—two stations, one at 2,500,000 gallons, and the other a little over 3,000,000 gallons a day—and pumps it 415 feet high, in round numbers, into a system which has lately been supplemented by what we call the Presidio Heights tank; that is a large, steel tank built on a concrete foundation, on the corner of Pacific and Lyon Streets; the top of it is at an elevation of 400 feet above tide; the capacity of it is 700,000 gallons. We own a whole 50-vara out there, so that eventually, as the demand increases, we can quadruple the capacity of this reservoir by building one, two, or three additional tanks on the same lot. The water that the Black Point pumping station pumps up to this, about 415 feet elevation, allowing 15 feet loss of head to go toward the westerly end of this district and toward this reservoir which I have just described, that district has its own absolutely independent supply from this pumping station and reservoir and tank. All the houses draw their water from the main pipes as it is being pumped, but any surplus water over and above what is being pumped—it may be that a cool morning starts in—the morning has been warm, fog comes in and people use less water; either they do not wash their sidewalks or sprinkle the gardens so much, and all of a sudden the hourly draught from that system becomes less, meanwhile our pumping goes on at the same ratio, and that allows this tank or reservoir at Presidio Heights to fill up, and it fills up until it is full, and should they pump a little bit more than it will hold, it does no harm, because the overflow is connected with what I described before as the Pilarcitos system, and it goes to the benefit of those people, and no water is lost. At the same time we take care not to pump any more, if possible, than the district needs. At the same time the night water is pumped. The pumps run night and day. We have a relay—one pump is running constantly, and the other is lying still. At a moment's notice, the second pump can be started, in case of a breakdown of the first, and we also have extra boilers. So that this district particularly, which is an important district and is quite combustible and exposed to high winds, has to have an extra-thorough fire protection.

"Now I come to the last district, the highest district that we have, what we call the 600-foot level, the Clarendon Heights pumping district. That consists of a fine pumping station in duplicate, built on Seventeenth Street near Noe. It draws the water from the Crystal Springs system near Harrison Street. It has also a connection with the San Andreas system in the vicinity of Valencia

Footnote, continued.

Street. So that, in case of there being a short supply in the Crystal Springs region, and that all of it is needed for the business part of the city, we can quickly open the gate from the Valencia Street system and supply the suction pipe of this double Clarendon Heights pump with water from San Andreas or College Hill water. From this pumping station, which has a capacity of about 3,000,000 gallons—1,250,000 in one pump, and 1,500,000 in the other, a day, pumping the water at an elevation of 600 feet above tide into what we call the Clarendon Heights tank, which is quite a large tank, 80 feet in diameter and 15 or 16 feet deep, built of strong metal on a concrete foundation, and roofed over and with an aerator on top, this water is pumped up into that district and supplies all the region which cannot be reached by the other 400-foot establishments—the ones I have just described. This upper district has grown tremendously the last few years; the people keep creeping up the hill—they like the view and the better air—and we have done all we could to follow them by having an independent main along the Corbett Road west of the Mission, at an elevation of about 500 feet above tide; also we followed them to the west to the Sunset region, which has been building up lately, away up on the hills south of the Park. This is approximately, in very few words—you may think it is a great many words, but it is as short as I can make it—a description of the distributing system of this city, showing how it is interlaced one with the other. Any one of these portions of these works here can be helped from the region lying up above by opening a gate and letting the water run in by gravitation. They can be helped, the upper one from the lower, by starting the respective pumps, by lifting the water from one station, from one level, to the other. There is one more intermediate station that comes in as a helper-out to either the Pilarcitos or San Andreas station, and that is the Lake Merced station. . . . (p. 70.)

In that manner we are handling a total capacity of about from 35,000,000 or 45,000,000 gallons a day, although the city now uses an average of about 35,000,000 gallons—it uses 35,000,000 gallons now, but through the year it will be an average of probably 33,000,000 to 33,500,000 gallons a day. By these various methods we draw a very large proportion from all the sources, or a small portion from each. Last year we were in the fortunate position, on account of this interchangeability, of needing to draw very little water from the Crystal Springs reservoir, for instance, and that being followed up by a good, big winter that has just passed, enabled us to store a great many thousands of millions of gallons of water in the Crystal Springs reservoir, and to help us carry over several poor years that might follow.

"Mr. Kellogg, Q. 109. Are there any adjunct or ancillary tanks or reservoirs or pumping plants to the city distributing system which aid, or are used to aid, in rendering these systems connected?

Footnote, continued.

"A. I believe I have mentioned the Lombard Street reservoir—no, I have not. We have a reservoir on the hills here at North Beach, called the Lombard Street reservoir, which is a brick-lined reservoir, and which holds the night water of this upper region I have described as the third story. The water flows into it from the Lake Honda reservoir by means of those various long pipe lines that I have described along Steiner, Scott and Devisadero Streets. It is not in use just now; we have just overhauled it, and are building a roof on it. It is at an elevation of about 300 feet above tide.

"We have a reservoir on the isolated hill called the Potrero Heights, at an elevation of 300 feet above tide, in round numbers; a masonry reservoir, which is fed by an independent pipe line leading across the entire Mission Valley from the Castro Street main, which lies west of the Mission Valley and is supplied by Pilarcitos or Lake Honda pressure, so that it gets the same water which is supplied to the Western Addition, what we call the third story. This reservoir in turn again gives fire protection and domestic-supply storage to the high houses around the Union Iron Works; a great many of the mechanics live on that hill, and it is to give them a better fire protection.

"The Ocean View pumping works were originally built before we built the Lake Merced pumping station, and they answered the purpose of supplying the water from the San Andreas pipe line into the Pilarcitos pipe line, but since we have got the Lake Merced pumping station constructed and in full operation, we have not used it lately, but it can be used at short notice in case of any accident to any of the pumps below or to any of the pipe lines. I do not consider it absolutely necessary now, but it is a good thing to have, in case, for instance, the pipes should break from the Lake Merced pumping station to the Ocean View pumping station. I have a gate there below the Ocean View pumping station, which I can instantly shut and pump water to assist the upper level, Lake Honda, from the San Andreas main at that point. It is a prudent thing to keep there.

"Q. 119. Then all the sources of supply of this company are interchangeable, and not only interchangeable in the city distributing system, but also from the mutual feeders they have, are they not?

"A. Yes, sir.

"Q. 120. How large an area is embraced within the various watersheds of the Spring Valley Water Company—just aggregate the area in miles?

"A. In the Lake Merced region about eight square miles; that is a region composed almost entirely of sandy soil, which has several strata of hard-pan underneath; the water during the rain sinks, and only in very big storms some of the water runs off the surface, and for that purpose, as I said before, we constructed the waste or drainage system to protect Lake Merced from the inflow of

c LAKE MERCED SYSTEM.

Lake Merced is located in the southwesterly corner of San Francisco County. It has an area of about 400 acres, and is fed by innumerable springs in the bottom and around the margin of this lake. The apparent watershed of the lake is between seven and eight square miles, and consists mainly of a sandy hard-pan formation, in the lowest portion of which Lake Merced, consisting of a north and south branch, is located.

A very effective system has been constructed, conveying the surface water of two creeks into the Pacific Ocean, and as the intercepting dams, in the respective creeks, go down to the tight hard-pan, the surface waters are not allowed to enter the lake, but are carried towards the ocean.

The average net yield of water of the two lakes combined (over and above evaporation) is somewhat in excess of three million gallons per day.

Footnote, continued.

these freshet waters. In San Mateo County we have in the neighborhood, now in use, of something like 36 square miles, with some additional square miles connected with the Lock's Creek line, which we propose to connect again with the works, making the total area something like 38 or 39 square miles. In Alameda County the Sunol dam controls the out-flow of that entire Alameda Creek system of, in round numbers, 600 square miles. Of this 600 square miles, about 140 square miles is comprised in what we call the Calaveras property or reservoir site; that would include, though, some 36 or 37 square miles of Arroyo Honda, which lies adjoining Calaveras, and when added to the direct Calaveras watershed of 103 square miles, makes it about 140 square miles. Next we have the San Antonio Creek system, comprising in the neighborhood of about 40 square miles; that lies northerly from the Calaveras region." [Schussler, pp. 47 to 77.]

By having constructed two dams, one between the North and South Lake and one at the old outlet (into the sea) of the North Lake (each dam with gate-well and outlet tunnel), the high-water mark of both lakes can be raised to about twenty-eight feet above tide. Its maximum storage capacity is over 2,000 million gallons.

On the shore of the South Lake, the Lake Merced Dumping Station is located, with two Corliss compound condensing pumping plants, each of a capacity of lifting three and a half million gallons a day, either from Lake Merced or from the San Andres pipe line, into the Pilarcitos pipe line.

The Spring Valley Water Company owns about $4 \frac{4}{10}$ square miles of land, within which tract both lakes are located.*

* The location of Lake Merced is shown in Exhibit 2 and also in Exhibits 21, 22, 23 and 24. The Exhibit No. 83 shows the Lake Merced properties in considerable more detail.

The cost of the property is shown in Mr. Reynolds' testimony at page 5798.

Table showing the detail of its cost is included in Exhibit No. 121. and Exhibit No. 122 shows the yearly outlays and taxes with interest and returns from sales and other sources.

Exhibit No. 9 is a blue print showing the construction to prevent the pollution of the water in Lake Merced from surface water. A general description of this is also shown in Mr. Schussler's testimony at pages 247-269.

Complainant's Exhibit No. 10 is a map of San Francisco showing Lake Merced and distributing reservoir.

Complainant's Exhibit No. 11 is a tracing of the Lake Merced property showing 1540.84 acres in San Francisco, and 827.67 acres in San Mateo County, making a total of 2368.51 acres.

The lake itself, as well as Map No. 8, showing the rainfall and the number of gallons obtained by it and the drainage system to prevent pollution, is described in Schussler's testimony, pp. 242-247.

The capacity of Lake Merced and its possibilities for storage reservoirs is shown in Schussler's testimony, pp. 271-274. The particular value of Lake Merced for storage capacity is shown in Schussler's testimony, p.

Mr. Stearns has described the Lake Merced sand as being fairly good for filtration, at page 4242. Mr. Hering has commended the diversion system to prevent the pollution of the supply, at page 3417, and Mr. Adams has also found the system entirely proper. Mr. Schuyler considered Lake Merced as one of the most valuable assets in case of emergency (p. 5415). Mr. Schuyler considers that the proximity adds so enormously to the value of the property as a reservoir as to off-set its value for general real estate purposes (p. 5416). Mr. Hering testified its value so great that it should not be sold for any purpose (p. 3772); that Boston is attempting to obtain land similarly situated within its limits as a precautionary reservoir (p. 3664),

Footnote, continued.

276; also in extracts from report of C. E. Grunsky, dated November 24, 1902, p. 48:

"The best available sites for water storage in large quantities near home, Crystal Springs reservoir and Lakes Merced, the latter for emergency use, are already in use. They should be a part of the municipal system."

See, also, report of Engineer Scowden in Municipal Reports for the fiscal year 1874-75, at page 651, where Mr. Scowden gives the yield of Lake Merced at 5,000,000 gallons; also, the report of Colonel Mendel, 1876-77, at page 834, where he says that the reliable daily supply of Lake Merced cannot be stated with definiteness, but that it is desirable. Mr. Schussler describes the Lake Merced property and its value, not only from his own judgment, but from those of other engineers, at pages 306-310, and gives Mr. Grunsky's report at page 312.

The cost of the entire system and its description, including the concrete dam at Colma Gulch and the masonry work necessary to drain off polluting water, and the various dams between and about the several lakes is shown by Mr. Schussler's testimony at pages 1225 to 1265.

Complainant's Exhibit No. 27, at page 116 et seq., contains a series of photographs showing the property under its varying conditions and from several viewpoints.

Complainant's Exhibit No. 128 contains Mr. A. S. Baldwin's appraisal of all the San Francisco real estate, including an appraisal of the Lake Merced lands, as of the value of \$13,650,000.

and that New York would purchase such land if it possibly could obtain it (p. 3667). Mr. Hering considers Lake Merced of exceeding value as a safety factor in case of accident (pp. 3727-8). Mr. Stearns testified that a distributing reservoir depended for its value not only on its supply, but also upon the insurance from interruption, and for this reason he considered Lake Merced of value sufficiently great to prevent its being abandoned as a reservoir (p. 4338).

In case of war, should the enemy surround the city, this supply would be a means of saving it from water famine. In case of public conflagration this source would be the means of replenishing the supply of Lake Honda to prevent the Western Addition, if saved, from being subject to a water famine.

Mr. Schussler describes the reason for the purchase of Merced and its use as an emergency measure in case of general conflagration in a manner which, having in mind the fact that Lake Merced water was being pumped into Lake Honda fourteen hours after the great conflagration of April, 1906, seems almost prophetic. Lake Honda's supply was cut off by the breaking of the main pipe down the peninsula in April, 1906. The interlacing of the various systems made it possible to use Lake Merced water to save the city from a water famine.*

* Mr. Schussler testified (p. 70):

The Lake Merced property was bought on my advice many years ago, although it was not in very good condition as regards quality. I advised our people to buy the land and buy the lake and the outlet and the riparian rights, and that when the time came I saw my way clear to make the water good. Secondly, we needed the station for the purpose of eventually carrying out my big plan of having a large central

Footnote, continued.

distributing system. If I live long enough, and they want me long enough, I am going to have all our city pumps concentrated on that property, so that from there, where all the water will arrive from the country and from everywhere, having a great big central pumping establishment, from which pumping station we can supply any and all hills clear up to Twin Peaks. In order to encourage the further acquisition of more lands around Lake Merced, and so forth, I suggested a plan to carry off, by an independent system of drainage, built of the most magnificent masonry that could be gotten up, so as to make it absolutely tight and safe—I devised a system of carrying the freshet waters and the surface waters that came down from the ranches in the neighborhood of Colma and Ocean View, and carried them straight to the ocean, and we have succeeded admirably in it, and in carrying off all the overflow of this country during the storms, when the wash of the hills would naturally go in the lake; we have intercepted them, and although we lose that much water, we rather lose it than spoil the good water. We have carried this water into the ocean by a splendid system of brick canal and tunnel, and thus have carried all the surface wash and water away, and kept it from interfering with the purity of the water in the lake. We have, for many years past, kept a regular system of analysis, both bacteriological as well as chemical, of the water in the lake, and it has constantly improved, and quite a number of years ago it was pronounced a first-class, potable water. This water from Lake Merced is pumped by a pumping station, which has a capacity of 7,000,000 gallons a day. It is also built in duplicate, both the boilers as well as the engines; each one has a capacity of 3,500,000 gallons a day, lifting it to an elevation of 460 feet above tide. In order to make this Lake Merced pumping station also as perfect and safe as any of the rest, I have connected with the suction pipe of both pumps a 22-inch pipe, which leads from Ocean View down, carrying the San Andreas water to the pumping station, not losing its pressure, and thus enabling us to pump water from the San Andreas reservoir, which is away out in San Mateo County, up into the Western Addition region by way of Lake Honda; either that, or we can take part of the water with one engine out of Lake Merced, and with the other engine from San Andreas, or we can run both engines from San Andreas alone, or both engines from Lake Merced alone, so that that has made that station very flexible. The great advantage of that great station so near the town is this: that should, in some tremendous earthquake or some accident, a number of outside lines or conduits break at once, we have right in town here, and constantly carrying a body of good, potable water, which few cities in the United States have got, from 1,000,000,000 to 2,000,000,000 gallons of pure water, and, aside from the domestic-supply proposition, in case of any great conflagration in this city, the very fact that we can start both of those pumps at a moment's notice and help out, especially the Western Addition or

3. LAND HOLDINGS AND WATER RIGHTS IN CONNECTION WITH PENIN- SULA SYSTEM.

Complainant owns considerable land or water rights in three of the peninsular streams located south of its present above described reservoir and watershed properties. The principal of these is Portola reservoir, which at present is constructed about sixty feet above San Francisquito Creek (p. 301), and if raised to ninety feet can be made to store 3200 million gallons (Schussler's testimony, p. 302). This dam can also be made a catchment basin for two streams on the western side of the Coast Range at present flowing into the ocean, to-wit: San Gregorio and Pescadero. (Shown on relief map, Exhibit 12.) When these are caught in the Pescadero system the waters will be conveyed into the Crystal Springs Reservoir. The Portola reservoir is twenty-five miles from the city.*

Footnote, continued.

woody part of the city, at short notice, is a very good thing. This water, as I have stated before, is pumped up on the hill to the south of Ocean View, a hill 460 feet above tide, into a large aerator. It is there aerated, and from there it runs down by a 30-inch connection pipe to the Pilarcitos pipe line on its way to Lake Honda, so that the Lake Merced water can be sent to Lake Honda and thereby to the Western Addition, or it is connected also with the San Andreas pipe and the water can be pumped from Lake Merced, thoroughly aerated, and then run into the San Andreas pipe line, and from there into town. (p. 73.)

* Mr. Grunsky said of Coast streams:

"They need not, therefore, be further considered unless it be to the extent that they can be made tributary to the Spring Valley Water Works system." (Schussler testimony, p. 316.)

And also:

"Some of this water is already used by and more could be added to the resources of the Spring Valley Water Works."

The watershed of Portola reservoir and surrounding properties with water rights is shown in Schussler's testimony pp. 301-304.

The waters from the Portola reservoir are to be conveyed into Crystal Springs reservoir by a conduit consisting of large redwood flume, iron pipe and concrete-lined tunnel, and will pass within two miles of Redwood City. These last named additional peninsular streams if properly developed and connected with Crystal Springs reservoir, can easily be counted on to furnish from 20 to 25 million gallons per day.

The resources of the Company on the peninsula and the Alameda Creek system, when developed, will yield 110 to 120 million gallons a day. (Schussler's testimony p. 208.)

4. SAN FRANCISCO DISTRIBUTING RESERVOIR AND PIPE SYSTEM.

The complainant has expended large sums of money in order that its reservoirs and connecting tanks should

Footnote, continued.

Colonel Mendel, at page 829 of the Municipal Reports of 1876-7 says:

"If any large quantity of water is derived from these sources it must be carried mainly in four or five months of the year and storage must be provided in the Crystal Springs Reservoir."

Coast streams with their watersheds are described in Schussler's testimony at page 280, and a general discussion of coast streams by Mr. Schussler, in which he gives the reports of other engineers, is shown at pp. 312-316. The same phenomena with reference to Stanislaus, Tuolumne and Merced Rivers, showing a variance from 14,000 cubic inches per second to 35 cubic inches per second inside of eight months in one particular case, is shown in the tables given in the State Engineer's report (Complainant's Exhibit 13), explained at pages 339-348 of Mr. Schussler's testimony. Exhibit 18 (p. 488) shows the location of the various reservoir sites in their proper governmental townships, including Lock's Creek.

comply with the necessities of a municipal water system in the one greatest requirement—constancy and reliability of supply. And Mr. Schussler explains it as follows: (p. 81.)

“The reason is that there is not an hour in the day that the draught on each reservoir is like the other hour; during the night very little water is drawn. Early in the morning at six o’clock, they start in to draw, and by eight o’clock a very big draught starts in, which runs nearly until noon; then there is a lull. Then again in the afternoon the draught starts in bigger. If there should be a very hot day, then the heavy draught continues almost continuously through the day. If, on top of the hot day, a big fire should take place, if there was no reservoir, there simply would be no water for the fire. The safety and efficiency of the Fire Department in putting out fire depends absolutely on the reservoirs from which that excess can be drawn by the Fire Department during the fire, and that, too, in addition to what the thousands of householders draw unconscious of the fact that there is a fire.”

The problem of water distribution in San Francisco is a very difficult one owing to the uneven and broken topography of the inhabited part of the city. The elevations vary from the filled-in portions in the southeasterly and easterly portions of the city, where the present streets are less than twenty feet above tide, to the hilly northerly, northwesterly, westerly, southerly and southeasterly portions of the city, where some ridges run up to 300 feet and over, while isolated hills and slopes have to be supplied with water to high elevations of over 500 feet. These reservoir locations are shown in complainant’s Exhibit 23.

5. PUMPING STATIONS.

There are three pumping stations in operation:

1. The Lake Merced pumping plant, in two units, lifting seven million gallons daily, either from Lake Merced or from the San Andres conduit line to the aerator on the Pilarcitos pipe line from where Lake Honda reservoir and the Western Addition of San Francisco is supplied.*

2. The Black Point pumping station, in two units capable of lifting six million gallons daily to the Pacific and Presidio Heights district.†

3. The Clarendon Heights pumping station, in two units, capable of lifting three million gallons a day from the College Hill district or from the University Mound district to and into the Clarendon Heights tank and its district at an elevation of 600 feet.‡

* The detail of Lake Merced pumping station is shown by a blue-print added to Complainant's Exhibit No. 9. It is described in Mr. Schussler's testimony at pages 1316-18. It is also shown in photographs forming a part of Exhibit No. 27, at page 141. Exhibit No. 65 also shows a certain amount of detail of the Lake Merced property.

† The Black Point pumping station is shown on Complainant's Exhibit No. 67, and is described in Mr. Schussler's testimony at p. 1320, and the cost is given in detail at pp. 1321-23. Complainant's Exhibit No. 27 shows photograph of the property at pp. 149-51. The locations of these pumping stations are also shown on Complainant's Exhibit No. 22.

‡ The Clarendon Heights pumping station is shown in Complainant's Exhibit No. 21 by a black square marked properly, and on Complainant's Exhibit No. 22, marked properly, located on Seventeenth Street. It is described in Mr. Schussler's testimony at pp. 1329-31. The details of its cost are given at pp. 1331-2. Portions of it are shown in photographs, Complainant's Exhibit No. 27, at pp. 145, 146 and 147.

6. TABLE SHOWING DISTRIBUTING RESERVOIRS.

There are nine city distributing reservoirs, and, with their approximate elevations and capacities in round numbers they are as follows:*

Name.	Elevation, feet.	Capacity, gallons.
University Mound	165	37,000,000
Francisco Street Reservoir.....		
(Subsidiary to University Mound) .	135	3,000,000
College Hill	255	14,000,000
Lake Honda	365	33,000,000
Potrero Heights Reservoir.....		
(Subsidiary to Lake Honda).....	315	800,000
Lombard Street Reservoir		
(Subsidiary to Lake Honda).....	305	2,500,000
Presidio Heights Tank	400	700,000
Clay Street Tank	375	250,000
Clarendon Heights Tank	600	500,000

* University Mound reservoir is shown in Exhibit No. 72 and described in Mr. Schussler's testimony at p. 1370, with details of cost given at 1371, 1372, 1374 and 1375. Complainant's Exhibit No. 27 shows photographs at pp. 164 and 165.

The Francisco Street reservoir is shown in Exhibit No. 75, and described at p. 1413 of Mr. Schussler's testimony. The location is shown on complainant's Exhibit No. 25, as well as complainant's Exhibit No. 23, marked No. 5. The detail of cost is given at pp. 1414-16. Complainant's Exhibit No. 27 shows photographs of the reservoir at p. 180.

College Hill reservoir is shown in complainant's Exhibit No. 73, and can be found on complainant's Exhibit No. 25, marked No. 2. The district supplied from this reservoir is called the College Hill District. It is colored pink on Exhibit 25, and lies in general outline between the district supplied by Lake Honda, colored blue on this map, and the district supplied from University Mound reservoir, which is colored yellow on this map. The general location of this district is between the easterly side of Valencia Street and the hills west of Valencia Street. The detail of cost is set forth in pp. 1382-88. Complainant's Exhibit No. 27 gives photographs of this reservoir at pp. 168 and 169.

Footnote, continued.

Lake Honda reservoir is shown in Exhibit 68, and in detail in the blue-print of Exhibit 69, with profiles shown at various points, and is described in Mr. Schussler's testimony at pp. 1344-49. The cost of the various portions is shown on pp. 1349-63. Cross-sections and details are also shown in Exhibits 70 and 71. Exhibit 27 contains photographs of various portions of the Lake Honda reservoir, at pp. 160 and 161. The reservoir is also shown in complainant's Exhibit 25.

Potrero Heights reservoir, which is subsidiary to Lake Honda, is shown on Exhibit 78, and is described in Mr. Schussler's testimony at p. 1423. It is found on complainant's Exhibit 23, in the Potrero region, marked with a figure "13." It receives its supply from the Castro Street region. The detail of its cost is shown on pp. 1424 and 1425. Complainant's Exhibit 27 gives photographs of portions of it, at pp. 186 and 187.

The Lombard Street reservoir is also subsidiary to Lake Honda. It is shown in Exhibit No. 74, and is described in Mr. Schussler's testimony at p. 1400. It is located on Russian Hill, on the block bounded by Hyde, Larkin, Greenwich and Lombard Streets. It is also shown on complainant's Exhibit 23, with the number "4," and by the same number on Exhibit 25. In the latter exhibit the district supplied is marked blue. This reservoir is sometimes fed from the Clay Street tank, but ordinarily, especially at night, it is fed from the Lake Honda region. It is an element of safety in case of conflagration in Chinatown. The details of its construction are set forth on pp. 1402-08. Complainant's Exhibit 27 shows a number of photographs of this reservoir, both during construction and since it has been finished, at pp. 172-178.

Presidio Heights tank has its foundation and ground plan shown in Exhibits 79 and 80. It is constructed at the crossing of Pacific and Lyon Streets, near the southeasterly corner of Presidio Reservation. It is described on pp. 1428-30 of Mr. Schussler's testimony. The details of its construction are given at pp. 1431-33. Complainant's Exhibit 27 shows photographs of its various portions, at pp. 189-91.

The Clay Street tank is located on the property west of Jones Street, and between Clay and Washington Streets. It is shown on complainant's Exhibit 23 as No. 7, and by the same number on Exhibit 25. There are three independent districts supplied from this region, which is controlled by this tank. They are shown on Exhibit 25, in brown, in the so-called Presidio Heights region. The tank is described in Schussler's testimony at pp. 1392-94. The construction of it in detail is given on pp. 1394-98. On the long profile map, shown as complainant's Exhibit 22, this hill is on the extreme right-hand side. This tank gets its water from the University Mound district. Complainant's Exhibit 27 gives photographs of this hill at p. 171.

The Clarendon Heights reservoir is shown in blue-print, Exhibit 77, and the condition of the hill prior to the building of the reservoir is shown by Exhibit 76. The tank is built on the top of a mountain, shown on complainant's Exhibit 22, near the right-hand portion of the profile marked "Clarendon Heights Tank" and colored purple. It is shown in both Exhibits 23 and 25 marked with the figure "9." It is described in

7. CITY PIPE DISTRIBUTING SYSTEM.

The city pipe distributing system is so arranged that the larger arterial pipes traverse the various pressure or supply districts longitudinally. At the time of the taking of the testimony the riveted wrought-iron pipes from 44-inch diameter down to 13 inches, acted as conductors of water to and through the various supply districts, and although connected at street crossings by means of gates with cast-iron laterals, *these wrought-iron pipe lines are not allowed to be tapped, either for house supply or for hydrant purposes.*

The cast-iron pipe of the city distributing system *has no house or hydrant connections directly on the 30-inch and 24-inch pipes, but the 22 and 20-inch cast-iron pipes, which are also main arteries, have a few house connections, while fire hydrants have generally been set on special 8-inch side branches, with 8-inch gates, between the large pipe and the hydrant connections. A large portion of the 16-inch cast-iron pipe, where it acted as a main artery, has also been kept free from house connections, so that, generally speaking, most of the fire hydrants and nearly all of the domestic supply connections are made on pipes from 12 inches diameter downwards.*

During the last ten years no new fire hydrants have been connected to pipes smaller than eight inches in diameter, and those that were originally connected with

Footnote, continued.

Mr. Schussler's testimony at pp. 1417-19. The detail of its description is shown on pp. 1419 and 1420. Photographs of the tank completed and during construction are shown on complainant's Exhibit 27, at pp. 182 and 184.

pipes of diameters less than eight inches have been cut off from the same whenever requested by the Fire Department, and if convenient they have been placed on larger new pipes. Frequently, when there was not a larger pipe in the same street, such a pipe has been laid especially for fire hydrant purposes and the hydrants placed thereon. During the past twenty years a large number of 6-inch and 4-inch pipe have been taken up and replaced by the company by pipes of large diameters on which the fire department had hydrants placed. In many of the small alleys and in the water front region, especially under the wharves, complainant retains 4-inch and 3-inch pipes as convenient and ample for supplying the domestic requirements of these alleys and the ships at the wharves. At the time of the trial of the case the city distributing system consisted of approximately:

(a) WROUGHT IRON PIPES.

Internal Diameter in Inches.	Length of Pipe in Feet.
44	7,213
37½	12,254
33	2,510
30	12,669
22	25,481
13	850

(b) CAST IRON PIPE.

Internal Diameter in Inches.	Length of Pipe in Feet.
30	4,494
24	46,363
22	19,183
20	21,840
16	126,153
12	265,037
10	8,489
8	701,453
6	570,977
4	376,114
3	130,755

Complainant's wrought iron pipes are made of the best American laminated wrought iron. Their workmanship is equal to the best boiler work in the country and they have all been thoroughly immersed and boiled in, and thus coated inside and outside with the best, most lasting and heavy asphaltum coating with which process complainant has had many years of successful experience. (Exhibit 92.)

The cast iron pipes are the best and toughest cast iron obtainable from American pipe foundries. For a great many years they have been specially made for complainant under their own specifications and under the eyes of their own experts who are regular employes of complainant trained for many years for that purpose. (Exhibit 93.)

Complainant's pipe has a heavier thickness of metal and a heavier and considerably deeper bell than is generally customary in American city water works. This is due to the fact that there is greater pressure on account of the hills and greater liability to be broken on

account of the swampy character of the land. On account of the location the Chief Engineer of complainant felt certain that a great conflagration once started would get beyond control of the Fire Department, and it was necessary to have the strongest construction and all of its water available every minute. (Schussler's testimony, pp. 543, 574 and 557.)*

Having in mind, therefore, the possibilities of earthquakes, the reasons for the many reservoir sites and for the interconnecting system can be the subject of discussion by counsel on a hypothetical case which, because of the calamity of April 18, 1906, will, of course, be more or less formulated on actual facts. The complainant's system was so arranged that in case of a breach of any part of the distributing system over the marshy

* The value of this was appreciated by Mr. Hering, the New York expert, when, in answer to cross-examination question 928 (p. 3584) he said:

"When you are surrounded or nearly surrounded with salt water, you have no means of supplying fresh water quickly from a near point if a calamity should arise.

"X. Q. 929. What sort of a calamity?

"A. Some large rupture of the aqueducts, or *perhaps an earthquake*, washouts, or explosions."

* * * * *

"X. Q. 932 (p. 3585). Is any such calamity more likely to happen here than it is in New York, for instance?

"A. What we read about the earthquakes of San Francisco would make me think that there might be some disturbance of that sort which should be considered here and which we would not consider in New York.

"X. Q. 933. Did you ever hear of an earthquake in San Francisco which ruptured a water pipe?

"A. I did not.

"X. Q. 934. Is there any reason why an interruption of the water supply, such as the rupture of one of the arteries supplying the city with water would be more serious here than it would be in the city of New York?

"A. There would be *some* supply available in the case of Long Island from the ground water and the streams."

lands, the Lake Merced system could be connected with any portion of the system, preferably Lake Honda, within 48 hours, so that with the water in that system the Western Addition of San Francisco could be saved in case there was a general conflagration. Had the Western Addition been burned this connection could have been made with the reservoirs that supplied the particular system supplying the part not burned. The wonderful efficiency of this interconnecting system and the necessity for it must have been forced upon the Court's mind by facts of which the Court must take judicial cognizance, even though they be not of record.

The value of the various elements of duplication in case of accident is especially shown (bearing in mind what happened on April 18th, 1906) by Mr. Schussler's testimony as to Lake Merced (p. 1227) :

"By this system of protection Lake Merced has become one of our city distributing reservoirs. It has a capacity when full of about 2,500 million gallons, and it being located within the boundaries of the city and county of San Francisco gives it a great and special value, especially as, by having a splendid pumping station constructed on the shores of this lake, we can, *at a moment's notice*, throw a large amount of water out of this lake into the Western Addition system of San Francisco *in case of an accident or break in the main pipe line leading water from San Mateo County to and toward Lake Honda.*"

In view of the fact that this testimony was given over a year prior to April 18th, 1906, it is prophetic.

There are certain facts within the common knowledge of all, and of such notoriety, that they require no evidence for their support. We believe that this Court

can and will take judicial notice of the fact that the earthquake of April 18th, 1906, broke the main pipe line leading from San Mateo County to Lake Honda, and that inside of 14 hours, where the business portion of San Francisco had been destroyed by the conflagration which followed, the Spring Valley Company with this splendid pumping plant and large supply of water was able to pump and deliver to the Western Addition from three to seven million gallons a day; that it thus saved the Western Addition from destruction, and after saving it from destruction was able to save the inhabitants of San Francisco from the greater disaster of a water famine. Lake Honda alone has only sufficient water for one day, and but for Lake Merced's provisional additional supply on that occasion the Western Addition would have faced a water famine inside of 48 hours after the accident. It was saved from famine only by this system of protection. This not only shows the great value of Lake Merced, but also the great value of the various other elements of precaution by way of duplication throughout the entire works of the Spring Valley, notably, the Niles dam and aqueduct, which is able to carry the water from Alameda Creek in case the Sunol aqueduct should give way (Schussler's testimony, p. 1155), and the duplicate pumping station at Millbrae in case the Belmont pumps should give way; and the duplication of pumps at Belmont, where one set of pumps can work in case the other becomes disabled for any reason.

See also his testimony concerning the Lake Honda system where he says (p. 1359) :

Lake Honda "forms a very important safety factor in connection not only with the Western Addition supply system but also with a number of these isolated districts that are fed from it; particularly, too, as in case of any disability in any of the districts below the level of the Lake Honda Western Addition district, instantly the water can be let out from the upper to come to the relief of the lower—*which would be done in case of a serious conflagration*; and, as I have stated before, the Lake Merced system with its capacity of 2,500,000,000 gallons of water within the city and county of San Francisco, being also connected with the Lake Honda Reservoir by a first-class duplex pumping system and with a first-class pipe connection, can also instantly be thrown directly to the relief of Lake Honda, but indirectly of the entire upper portion of the city, thus providing a storage reservoir of 33,000,000 gallons of water constantly on hand, with but slight variations, at this high level of 367 feet above city base."

8. DIFFICULTIES OF DISTRIBUTION AND HOW SURMOUNTED.

- a. AS TO DIVISION IN DISTRICTS OF SAME HEIGHT.
- b. AS TO HIGH CHARACTER OF IRON IN PIPE.

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- a. AS TO DIVISION IN DISTRICTS OF SAME HEIGHT.

Because of the many hills in San Francisco it has been necessary to divide the city into distributing districts. These are shown on complainant's Exhibit 81. District A is colored green, and is bounded by the south line of Main Street, the west line of Ninth Street, the entire width of Market Street as far south as Franklin Street, thence over into the business portion of town,

thence along the water front to Main Street. This district comprises the most difficult portion of San Francisco in which to lay a pipe system. District B is colored pink, and comprises the outlying Mission district, and Presidio and Van Ness Avenue about Lombard Street. The third district is colored yellow and marked district "C," and is the far outlying district. The entire description of the districts and the manner in which they are piped is given in Mr. Schussler's testimony, pp. 1453-4. The costs of these various pipes by districts are given on pp. 1491-1501. Certain special structures which form a portion of the distributing system are also described on pp. 1499-1501. The photographs showing the manner in which the pipes are laid, the various obstructions necessary to be met, and the details of difficulties which have been actually met in various portions of the town are described on pp. 1460-91 of Mr. Schussler's testimony, and are graphically shown in photographs in complainant's Exhibit 27, pp. 193-223.*

* Mr. Stearns testified:

"The difficulties of distribution in San Francisco are very great, on account of the many hills in the city and their height. They are very different and very much more extensive than in any large Eastern city. . . . The topography is very unusual, and I do not know of any large city in the United States that is as difficult to supply by a distributing system as San Francisco. . . . It is necessary to divide the city into districts of different elevations, so that a water pressure which is not too great or too small may be furnished in each, and the water should be supplied to those districts in sufficient quantity. This makes it more expensive both in construction and in operation. (p. 4215.)

Mr. Schuyler testified in reference to the distributing system:

"The difficulties are chiefly due to the irregularity of the topography, the unevenness of the elevation, the extremes of elevation in different parts, oftentimes in close proximity, and the

Footnote, continued.

isolation of various portions of the city into ridges, peaks or elevations, separated by deep valleys, necessitating a complicated system of reservoirs to reach the extremes of elevation, and a number of zones of supply which must be independent of each other and yet be made interchangeable. Another feature of the topography and geology of the city presenting difficulties is in the existence of a large proportion of solid rock underlying its streets. Many of the streets have been cut through solid rock, and a large proportion of the pipes have been laid where it must have been necessary to excavate the trenches in solid rock. This has increased the difficulties and the cost of construction of the distributing system over what it would have been in soil. (p. 5390.)

Mr. Hering testified concerning the distributing system:

"I find the topography to be so broken that a distribution system becomes rather difficult and expensive on account of the many high hills within the municipal territory, which are used for building purposes, and from the fact that some of them are isolated, requiring the construction of special mains to supply such hills before a distribution of water can be established. . . . The topography of the city is unusual. I do not know of any other large city in the United States that is so difficult in reference to its topography for the maintenance and operation of a distribution system of water supply. The essentials for distribution here are, a sufficient quantity of water which has a sufficient and proper pressure at all points. . . . Therefore the city has been divided into several zones so as to have more uniform pressure in each one of the several zones. . . . It is advisable to so lay out the distribution system that the pressures in the pipes while sufficient for fire purposes are yet not so great as to be a discomfort for domestic use. This must be, and usually is, accomplished by dividing the territory where great difference of elevation exists, into zones, each zone having its own pressure different from that of the pipes in the other zones." (p. 3404-5.)

In answer to the question: "Does the fact of such a topographical condition existing here tend to render the distributing system more expensive in its construction and in its operation?" Mr. Hering answered:

"It certainly does, partly for the reasons stated and partly that there are required special pipes merely for the purpose of transferring water from one to the other, which might not otherwise be necessary." (p. 3406.)

Mr. Hering also testified:

"The water pipes are generally laid first while the city is building, before other utilities are put into the ground, and it is fair and just that the rate-payer should pay a rate which would give an income upon the increased value of that pipe due to the fact that the difficulties of laying have increased."

As to value of pipe because of its position, Mr. Schuyler testified:

"Inasmuch as a large proportion of the distributing system was laid at a time when the cost of labor was lower than it is at present, and as the difficulties of laying pipes in the streets are now greater than they were when the pipes were laid, particularly those of

Footnote, continued.

In reference to the distributing system Mr. Adams testified:

"There are a number of difficulties in San Francisco which are somewhat unusual. In the first place, San Francisco is built upon land ranging in elevation from tide-water to something like 600 feet above tide, making it necessary in the distribution of the water that it be delivered under various pressures suited to the ground elevation in the different parts of the city. In addition to this the difficulties of laying pipes in the street are such as are usually encountered in large cities, in that the streets are already largely occupied with many classes of conduits, including sewers, gas pipe, electric power, cables, telephones, cable roads, and the like . . . Its topography is very unusual. There are very few cities in which such a wide range of elevation exists. . . . I know of no city in the United States that is as difficult in this particular. . . . It is necessary that a distributing system be divided into several different zones of elevation. . . . It is also necessary that these different zones be operated separately, practically as independent systems, one from the other. It is also necessary, or at least desirable that these systems or zones be inter-connected in such a way that should for any reason any interruption in supply exist or happen in one, water supply may be obtained from the one above . . . Compared with cities where the topography of the city which is covered by the distributing system is practically level, the original cost of the distributing system of San Francisco, including reservoirs, is much larger. . . . The larger investment in the one instance operates to make a higher water rate than prevails where the low investment is sufficient. Then, too, the operating expense is likely to be higher in a system so built than in one delivering all the water to the same level. . . . In the case of a system of works built practically on one level it is customary to centralize all pumping machinery in one station, and to erect one or two stand-pipes at suitable points. This centralization of pumping machinery makes possible considerably less expensive operation than can be accomplished where it is necessary to have a number of pumping stations, as is required in the case of different zones of pressure." (pp. 4662-64.)

earlier years, owing to the pavements and the cost of removing and restoring them, as well as the difficulties presented by the net-work of sewers, electric light conduits, street railways, other pipe lines and conduits of various sorts, the probabilities are that the cost would be no less than the original cost and it might be materially greater. * * * The admirable system by which the several parts of the plant are interconnected and made so interchangeable as to permit of any one source of supply being temporarily put out of service and its place being taken by the others without interruption to the general supply of the city, giving advantages that are very manifest and these advantages are to be multiplied in the future as new sources are drawn upon and additional conduits are laid." (pp. 5443-44.)

"As to the city distributing system, considering the topography of the municipality, and without reference to the details concerning the pipes in the street, I think it is in every respect efficient, proper and safe, and in the whole plant supplying San Francisco I have not discovered any structures, properties or investments that are extravagant, useless or undesirable." (Schuyler, p. 3445.)

b. AS TO HIGH CHARACTER OF IRON PIPE.

Complainant has installed pipe of a peculiar construction known as laminated iron. It is almost entirely made of wrought iron. The first pipe line built of this was the Pilarcitos pipe line, and the manner of its construction has been fully explained in Mr. Schussler's

testimony. It will be given in full as it illustrates the thoroughness of the precautions to prevent accidents.

Mr. Schussler testified:

"In those days we had it rolled out first into bar-iron, long flat bars 40 or 50 feet in length, 8 inches wide and from five-eighths to three-quarters of an inch thick. These were cooled and then sawed off to a length which would equal the future width of the plate. These bars were piled on top of each other, wired together, heated in the furnace to a white heat and then passed through the rollers sideways until they had been squeezed down so that the width had been drawn out about to equal the width of the future sheet. Then this slab, which had now come down to a thickness from five-eighths to three-quarters of an inch, or a little more, was suddenly turned around half ways and was passed through the rollers again longitudinally with the original grain of the bundle of bars, thus giving not only a good grain sideways but an excellent grain lengthwise. We kept on with this method, which cost us something extra, but which had a great many advantages that I will detail hereafter, until, of later years, it was superseded by a method of making these piles in the rolling-mills in a somewhat different way. There was more scrap-iron in the market at the time, and we then put a large slab of extra soft charcoal iron, if it possibly could be obtained at reasonable prices, on the bottom, and on that we piled scrap-iron crossways and lengthwise from ordinary boiler plate-iron, say from one-quarter to five-sixteenths of an inch thick up to three-eighths of an inch. These were piled one on top of another until finally on the top of the pile, when it reached 8 or 10 inches in thickness, we put another slab like the original one. This pile was put into the furnace and heated to a white heat and passed through the rollers first sideways and afterwards lengthwise, thus building up the sheet or the plate until its proper thickness, length and width was obtained. When it had cooled off, the edges and sides were sheared off care-

fully and these shearings were again used as scrap for the next piles or blooms. The main object of this was that as there is considerable alkali in the soil of California, not only on the peninsula, but also in the country, and particularly in the country east of the bay, and it is still more emphasized in the San Joaquin Valley, I found, at an early day, that if iron was thus prepared in a stratified manner it would resist the rust very much better and very much longer than if iron was made of a character that is called homogeneous, if no attempt at stratification was made. Whenever, by some chemical action of the outer soil by alkali, salts or other ingredients in the soil, the life or consistency or rightness of the outer asphaltum coating had been injured or destroyed, then, with the metal being of a homogeneous character it would, when once attacked by rust, the rust would soon penetrate it and pit it. You can best compare it with small-pox pitting. It would make the metal porous and would destroy it in a very short time, as was shown in various instances on this coast with various water works that used homogeneous metal, and particularly homogeneous steel, which naturally, owing to a much cheaper method of manufacture, is cheaper at the beginning but much dearer in the end. So, in this work, I have always been insisting that whenever the time was to be had, in an important piece of work of this kind, we always had laminated iron and were extremely successful with it. *Pipes that were laid in 1866 or 1867, or from 37 to 38 years ago, are to-day in full operation, under a big pressure.* If occasionally there is a spot found where the alkali has in a particular piece of ground somewhat injured the pipe we cut out a short length and replace it by other iron. *If, instead, we had tried to save money at the beginning—perhaps a cent or a cent and a half a pound in the original cost of the iron, that pipe would have been destroyed probably once or twice since and would have had to be renewed entirely since the beginning.* WE FOUND THAT THE SLIGHT EXTRA COST OF THE MAGNIFICENT METAL THAT WE THUS PREPARED UNDER OUR OWN SUPERVISION IN THE EASTERN MILLS HAS BEEN THE MOST

ECONOMICAL THING WE HAVE DONE." (p. 778, Schussler.)*

This iron was more costly, but it was true economy, because of the difficulty in relaying the pipe in case of any accident to it. This difficulty became much intensified after the bitumen pavements were laid. On this point Mr. Hering testified that the pipe was "more expensive so far as the first cost is concerned, but considering the durability I would consider it finally the more economical system.

Q. 107. In your opinion, is the extra initial cost that has been incurred by the complainant and its predecessor in installing and laying their pipe lines in the way

*The manner in which the 44-inch Crystal Springs pipe line was built is also described by Mr. Schussler (p. 978):

"This was made by my prescription at that time by running it out in bars 8 inches wide and about five-eighths of an inch thick and 50 or 60 feet long; they were cooled slowly and then they were sawed off in lengths about equal to the future width of the sheet. They were then piled on top of each other, wired together and again reheated in the furnace, and after being brought to a white heat they were drawn out by passing them through the roller sideways. (Q. How many on top of each other?) From 10 to 12, sometimes 14 layers. Those bundles of flat bar-iron were drawn out sideways until the plate had got down to a thickness of probably three-quarters of an inch and had been drawn out to a length which equaled about the future width of the sheet or plate. Then the slab was quickly turned around at right angles and passed, for the rest of the time, through the rollers lengthways—not sideways—thus drawing it out longitudinally to the full length of the sheet and a little over, thus getting the original longitudinal grain of the bars in the longitudinal portion of the plate. In this manner I got a first-class grain and tensile strength sideways in the plate, which is generally called 'transverse strain,' and also a magnificent longitudinal strain. That is the manner in which most of this iron has been made that I shall describe hereafter in the laying of our various pipes, with the exception of the pipe that I shall describe in detail in connection with the new Alameda pipe which was made somewhat different, and I shall give that in full detail."

they have, and of the material they have, and in the methods they have, justified in reference to the supply of water to the municipality of San Francisco and its inhabitants?

A. I should consider this additional cost entirely justified as it exemplifies good business principles." (p. 3413.)*

* And Mr. Stearns testified:

"I believe that the extra initial cost of the constructed works which has been incurred by complainant in installing and laying their pipe lines in the manner in which they have and of the material which they have used, and in the method of construction of pipes themselves, that is, before they are rolled, is justified when considered with reference to the supply of water for a municipality of the size of San Francisco. . . . In the first place, I believe that first-class work is warranted in the supply of any large city. I have examined pipes which various persons have told me had been in the ground a very long time, and they showed a remarkable state of preservation, particularly in comparison with other riveted pipes which I had examined. . . . The methods of construction which provide this long life were explained to me and seemed to be fully justified; in fact, throughout the works I have been very much impressed with the success which has been attained both in getting effective results and in reaching what is in the long run economy in construction." (pp. 4239-40.)

Mr. Schuyler testified:

"It is a well-known fact, generally admitted, that the pipes of the Spring Valley Water Company, made of laminated iron, have actually lasted longer and been more durable by far than any other riveted pipes in existence made of the ordinary merchantable iron or steel. In view of this fact and the low cost of maintenance of the system which such extreme durability permits, it becomes really an economy and a justifiable expense to incur the extra cost required to produce such results. I therefore would unqualifiedly say that such extra initial cost is justifiable. . . . In my examination of the system I have been able to discover no riveted pipes of laminated iron which have shown any material symptoms of weakness or corrosion, of whatever age they happen to be, and as far as external appearances go, the pipes that have been laid for upward of thirty years, particularly in sandy soil, are good for as many more in the future. Hence in my judgment there is likely to be a decided economy . . . in the use of this more expensive material for those pipes." (pp. 5399-5400.)

9. HISTORIC REVIEW OF THE WATER SUPPLY OF SAN FRANCISCO.

Complainant commenced to furnish water under the law of 1858, Stat. of Cal. 1858, p. 218, which encouraged private enterprise to embark in the business of supplying cities and towns in California with water.

This continued until the new constitution of 1879 which, by article XIV, provided that the rates should be fixed by the public authorities annually. This was followed by the Act of March 7, 1881 (Stat. 1881, p. 54), where the procedure to be followed by the board of supervisors was mapped out, and by the Act of March 12, 1885 (Stat. 1885, p. 95), where the rentals outside of towns were fixed at a basis so that the net returns should not be less than six nor more than eighteen per cent upon the value. The Spring Valley Water Works attempted to have this constitutional provision declared to be unconstitutional, claiming that it led to taking and did take property without due proc-

Footnote, continued.

Mr. Adams testified:

"In my investigation of the works I have seen no reason to seriously question the economy of the method pursued by the Spring Valley Company in the construction of the pipes. . . . I am of the opinion that it has been the part of wisdom and economy to use laminated iron in their construction and to lay them with the care that has been exercised. It is further justified because it is a duty on the part of those charged with the responsibility of supplying a great city with water, to, so far as it is practicable, eliminate risk of interruption in the service. In view of the long and successful experience of the company with this class of material, I deem it the part of prudence and economy that they should adhere to the use of material of known merit rather than experiment with other materials which might prove of much less enduring quality." (p. 4675.)

ess of law, and the Supreme Court of the United States held in *Spring Valley Water Works v. Schottler*, 110 U. S. 347 that the board of supervisors were a body formed

“to administer the local government, and in so doing to provide that all shall so conduct themselves, and so use their own property, as not unnecessarily to injure others. . . . By the constitution and legislation under it, the municipal authorities have been created a special tribunal to determine what, as between the public and the company, shall be deemed a reasonable price during a certain limited period. Like every other tribunal established by the legislature for such a purpose, *their duties are judicial in their nature, and they are bound in morals and in law to exercise an honest judgment as to all matters* submitted for their official determination. It is not to be presumed that they will act otherwise than according to this rule.”

In 1858 and 1859 the prevailing rate of interest was 24 per cent per annum. This prevailing rate for commercial loans of large sums of money gradually lowered at the rate of about three per cent every third year until 1872, and then it remained stationary at nine per cent until 1880; then varied from eight per cent to seven per cent until 1898, and then for four years was six per cent. Statistician Wright gave these figures in full (p. 3382-5).*

* Between 1865 and 1878 Spring Valley was paying interest itself on borrowed money ranging from 8½ per cent to 12½ per cent, as shown by Dockweiler's table, p. 637, and at such times business men were not investing money unless they received a very high rate of return. This is aptly expressed by Prof. Plehn, whose paper was introduced by our adversaries during Dockweiler's testimony, as follows:

“The difference between these rates (California interest rates) and those that have prevailed elsewhere are explained as fol-

Under the law of 1858 the price was regulated by a commission of four, two of which were appointed by the city and two by the Water Company. In case of disagreement the four were to choose a fifth commissioner. If they could not agree on the fifth commissioner the Sheriff appointed him.

While this was the condition of affairs and while the Spring Valley stockholders could have obtained one and one-fourth per cent from the savings banks on their money, and while the prevailing commercial rate of interest was two per cent a month, complainant purchased what was then outside wild lands and laid the foundation for the wonderful water works it now has.*

Footnote, continued.

lows: Railroad connection with the East was completed in 1869. Prior to that time California was isolated, was a new country, and all the economic conditions were peculiar. Capital was comparatively scarce, and opportunities for its investment were innumerable. Hence the rates of interest were abnormally high. The current rates in early days were quoted at $1\frac{1}{2}$ to 2 per cent a month. As will be seen from the tables, the savings banks could pay $1\frac{1}{4}$ per cent a month dividends even ten years after the arrival of the Argonauts. The thrifty Michael Reese is said to have half repented of a generous gift to the University of California with the exclamation: 'Ah, but I lose the interest!' a very natural regret when the interest was 24 per cent per annum." (Dockweiler's testimony, p. 616.)

* Mr. Reynolds testified: (p. 5825-26.)

The Savings and Loan Society, which is the oldest established bank in the city, published a statement, which reads as follows: "Rates of semi-annual dividends disbursed by the Savings and Loan Society since its organization: Per month: "January 21, 1858, on all deposits, $1\frac{1}{2}$ per cent per month; July 21, "1858, 1 5-8 per cent per month; January 21, 1859, $1\frac{1}{4}$ per cent "per month; June 21, 1859, $1\frac{1}{4}$ per cent per month; January 21, "1860, $1\frac{1}{4}$ per cent per month; July 21, 1860, $1\frac{1}{4}$ per cent per "month; January 21, 1861, $1\frac{1}{4}$ per cent per month; July 21, 1861, "1 per cent per month; January 21, 1862, 1 per cent per month; "July 21, 1862, $1\frac{1}{8}$ per cent per month; January 21, 1863, 1 1-15

Complainant's stockholders expected the city to grow, they knew their properties would grow with it; they expected that the value of their investment would increase with it; and instead of investing their money in loans which would produce them two per cent per month; they preferred to invest their money in property which would acquire an unearned increment. As, according to the Schottler case, the board of supervisors were presumed "to exercise an honest judgment as to all matters submitted for its official determination," it must be apparent that all valuations based on the cost of these properties (which was attempted by some of defendants' experts), would be absolutely unfair, and in contravention of the principle of law which received its latest enunciation in the New York Gas Rate case when the Circuit Court of the United States for the Southern District of New York, in *Consolidated Gas Company v. City of New York*, 157 Fed. 849, held as follows:

"The value of the investment of any manufacturer in plant, factory or goods, or all three, is what his possessions would sell for upon a fair transfer from a willing vendor to a willing buyer; and it can make no difference that such value is affected by the efforts of himself or others; by whim or fashion; or, what is really the same thing, *by the advance of land values in the opinion of the buying public*. It is equally immaterial that such value is affected by difficulties of reproduction. If it be true that a pipe line under the New

Footnote, continued.

"per cent per month; July 21, 1863, 1½ per cent per month; January 21, 1864, 1 1-10 per cent per month; July 21, 1864, 1 per cent per month; January 21, 1865, 1 per cent per month; July 21, 1865, 1 per cent per month; January 21, 1866, 1 per cent per month."

York of 1907 is worth more than was a pipe line under the city of 1827, then the owner thereof owns that value; and that such advance arose wholly or partly from difficulties of duplication created by the city itself, is a matter of no moment. . . . If fifty years ago by the payment of certain money, one acquired a factory and the land appurtenant thereto, and continues to-day his original business therein, his investment is the factory and the land, not the money originally paid. . . . The so-called "money value" of real or personal property is but a conveniently short method of expressing present potential usefulness, and "investment" becomes meaningless if construed to mean what the thing invested in cost generations ago. Property, whether real or personal, is only valuable when useful; its usefulness commonly depends on the business purposes to which it is or may be applied. Such business is a living thing and may flourish or wither, appreciate or depreciate; but whatever happens, *its present usefulness*, expressed in financial terms, must be its value."

Prior to 1865 there were two water companies in San Francisco, one on the upper Pilarcitos dam conducting the waters of Pilarcitos Creek and tributaries and upper San Mateo Creek through a tunnel, flume and pipe-line of a total length of 32 miles into the partly finished Lake Honda reservoir and the Market Street reservoir, which has since been destroyed by the cutting through of Market Street. This supplied the North Mission, Hayes Valley, part of Western Addition, and the main business portion of the city. The other, the Spring Valley Water Works, at that time obtained two million gallons a day from Lobos Creek in the northwestern portion of the county. These two enterprises were consolidated as the Spring Valley Water Works in 1865. In the second half of the '60's the

larger Pilarcitos reservoir and its new conduit into San Francisco as already described, were built. In the latter part of the '60's and early part of the '70's the San Andres dam and its independent pipe line were built. Both of these reservoirs were some years later increased in capacity by raising the two dams. In the middle of the '70's the upper Crystal Springs reservoir was built, and a short time afterwards the rest of the reservoir site was acquired, all of this being done gradually of necessity, in order not to unduly enhance the value because of anxiety on the part of the Water Company to purchase from persons who knew the territory was of a character particularly available for reservoirs.

The lower or concrete Crystal Springs reservoir, which is the main storage plant of complainant, was commenced in the middle '80's (Mr. Schussler's testimony, p. 163), and about the same time complainant acquired the land and water rights at Lake Merced and erected a pumping plant on the north lake and connected the same by a pipe line with the San Andres main conduit line delivering water into College Hill reservoir. In 1885 complainant constructed the 44-inch wrought-iron Crystal Springs pipe line from upper Crystal Springs reservoir to the new University Mound reservoir, thus sending a much larger supply from this important source into San Francisco by gravity instead of pumping, as theretofore. (Mr. Schussler's testimony, p. 163.)

In 1888 complainant completed the original Alameda Creek works as far as the 44-inch Crystal Springs pipe line near Burlingame with a double 16-inch sub-

marine pipe crossing the bay. (Schussler's testimony, p. 164.) About this time the original Belmont pumping plant was completed. This pumping plant is shown in Exhibit 64 and described in Mr. Schussler's testimony, p. 1267. The foundation of the concrete Crystal Springs main dam was built and raised to its present height of 145 feet, which is 200 feet above tide, in 1887 to 1890, and thereupon the 44-inch Crystal Springs pipe was disconnected from the upper dam and joined to the lower dam. In 1897 the Pilarcitos pumps were constructed, forcing San Andres water into the Pilarcitos pipe line. In 1898 the Crystal Springs emergency pumping station, with conduit to San Andres reservoir, and also the Millbrae pumping station, were completed. The former is shown in Exhibit 66, and described at p. 1301 of Mr. Schussler's testimony, and the latter is shown in Exhibit 65 and is described at p. 1279 of Mr. Schussler's testimony.

The Millbrae pumping station is particularly important because it makes it possible to deliver either Alameda or Crystal Springs water into the higher San Andres pipe line.

In 1900 the Sunol filter beds and aqueduct on Alameda Creek system were completed, thereby largely increasing the capacity and improving the quality of water. During 1902 the double line of submarine pipes under the bay were completed. This increased the carrying capacity of the Alameda conduit. In 1903 the 54-inch Alameda pipe line from Burlingame junction of the Crystal Springs and the Alameda pipe line to the Millbrae pumping station, enabled complainant to double the capacity of the Belmont pumping plant.

During the period of thirty-eight years from 1865 to 1904 the population and consumption of water in San Francisco gradually and steadily grew and naturally required an enormous expansion of the city distributing reservoir and pipe systems. Cable roads were constructed, rapidly populating the hilly parts of the city, and water was required and demanded everywhere at elevations varying from sea-level up to over 500 feet above tide. The electric roads came and spread and scattered the city rapidly over a very large area, and complainant was compelled to extend its reservoir, pumps and pipe system.*

* Mr. Schuyler testified (p. 5412) that the complainant's pipe lines were capable of delivering daily the following:

Name of System.	Amount of Gallons Daily.
Pilarcitos pipe line	14,400,000
San Andres pipe line	12,760,000
Crystal Springs pipe line with full reservoir.....	25,100,000
Alameda pipe line from Sunol dam	16,500,000

Making a total of68,760,000 daily

With the Crystal Springs reservoir only two-thirds full, or in case of accident to the Sunol dam so that the Niles dam would be used, this supply would be cut down by 10,000,000 or 12,000,000 gallons.

Mr. Schuyler showed the necessity for being prepared to meet extraordinary draughts by showing that on September 8, 1904, 44,590,000 gallons were used. (p. 5402.)

Mr. Hering called attention to the fact that San Francisco at times consumed 42,000,000 gallons per day. (p. 3861.) Mr. Schuyler called attention to the fact that other cities were compelled to recognize that occasional hot spells would bring about extraordinary draughts. In Denver where the average consumption is 16,000,000 gallons a day, he testified that they often used as high as 45,000,000 gallons a day; and in Los Angeles, where the average consumption was 30,000,000 gallons, they often used as high as 38,000,000 gallons a day. (p. 5412.)

[Note.—This page comes immediately before the words, “During the last decade railroad facilities to this coast have materially increased.” See following page 231.]

We have employed the word “duty” not in its strictly legal sense as an obligation on the part of the company which will be enforceable in an action against it, but as a moral obligation existing on its part to provide for the future of a municipality which looks to it alone for its water supply; this duty to anticipate future demands has been fully performed by the timely acquisition of the Alameda System. A recognition of this moral duty on its part must necessarily imply a reciprocal moral duty on the part of the municipality to properly compensate the company for the water being furnished from all its properties and capable of being furnished through the acquisition of the properties acquired to anticipate demand. But the complainant is under no moral or other duty whatsoever to keep on supplying water or increasing that supply if it must do so at a loss or without a fair return.

10. PROSPECTIVE GROWTH OF SAN FRANCISCO.

Complainant did not expend all this money as a mere voluntary business venture—it followed its duty as a quasi-public corporation.

The rule with reference to the duty of a private corporation furnishing water to a municipality was recently laid down by a New Jersey court as follows:

“The supplying company is, as we have seen, under obligation to keep in advance of the present demand and take liberal account of the probable increase of demand due to increase of population. I think the language of Mr. Justice Dixon, in *Slingerland vs. Newark* (54 N. J. 62, 69) is apt on this point. ‘It would of course be absurd for the city to construct water works adequate only for its present wants, and the prosecutor does not assert that the works now contemplated are unreasonably large in view of the city’s prospective growth.’ This is in strict accord with what was said by Justice Van Syckel, in *Olmstead v. Morris* (47 N. J. 329), as follows: ‘In a matter of extreme necessity all contingencies must be provided for and the supply must be so ample that a lack of water cannot be apprehended.’ ”

Long Branch Commission v. Tintern Manor Water Co., 62 Atl. 474-479.

During the last decade railroad facilities to this coast have materially increased. Large sums of money have been spent in advertising California. The climatic, agricultural and commercial advantages of our state and city have become much better known and appreciated in America as well as elsewhere. During the last five years the population of San Francisco, as well

as the water consumption, has increased much more rapidly than theretofore. Taking these last five years as a basis and analyzing the causes that brought it about, Mr. Schussler estimated the probable future daily consumption (p. 1561). Similarly Mr. Grunsky estimated the probable daily future consumption. Mr. Grunsky's figures, however, commenced at the year 1913 and ran for every five years thereafter. Mr. Schussler's estimate was from 1910 and ran every ten years thereafter. Mr. Schussler did, however, by a system of interpolation, work out Mr. Grunsky's figures for the same years. Consequently we have the estimate for the future daily use in San Francisco by these two engineers as follows (p. 1561) :

TABLE SHOWING ANTICIPATED DAILY CONSUMPTION.

Year	Daily consumption estimated by Mr. Grunsky.	Daily consumption estimated by Mr. Schussler.
1910.....	33,300,000	40,000,000
1920.....	39,000,000	55,250,000
1930.....	45,400,000	72,000,000
1940.....	51,700,000	90,250,000
1950.....	59,500,000	110,000,000

Mr. Stearns gave it as his opinion (p. 4220) that the figures of both were too small: "Mr. Schussler's estimate is larger and consequently agrees more nearly with my views than Mr. Grunsky's."*

* Mr. Stearns gave his opinion as to the probabilities as follows :

"It is the general experience in the large cities in the country that the consumption of water has increased much faster than the estimates made in advance and based on past rates of water consumption. The water consumption in San Francisco at the present

Footnote, continued.

time is much lower than in nearly all, if not all, of the large cities in the country. In recent years the consumption in San Francisco has shown a decided tendency to a more rapid growth. Such has been found to take place in nearly all if not all cities which are larger or of nearly the same size as San Francisco. In view of all this evidence, together with the fact that San Francisco is the principal city on the Pacific Coast and appears to be growing rapidly at the present time, I think that, for safety in the construction of a far-reaching scheme such as the Tuolumne system, a higher estimate should be made than that given by Mr. Schussler, and a very much higher one than that given by Mr. Grunsky.

Q. 94 (p. 4221). "I will ask you if you have facts and statistics in regard to the consumption of water in other cities, either larger or practically the same population as San Francisco, over a period of years showing the growth in consumption? If so, please give them."

A. "I will state first the statistics relating to the works with which I am connected. This district comprises Boston and nineteen other cities and towns in its vicinity. The statistics since 1890 as to the population, the consumption in gallons per day and the consumption per capita per day are as follows:

Year.	Population.	Consumption in gallons per day.	Consumption per capita in gallons per day.
1890.....	662,432	48,086,000	72.5
1891.....	.....	.....	....
1892.....	.....	.....	....
1893.....	723,153	66,165,000	91.5
1894.....	743,354	65,382,000	88.0
1895.....	763,557	69,499,000	91.0
1896.....	786,385	78,360,000	99.7
1897.....	809,213	80,793,000	99.8
1898.....	832,042	83,651,000	100.5
1899.....	854,870	92,111,000	107.8
1900.....	877,698	98,059,000	111.7
1901.....	903,000	104,645,000	115.9
1902.....	928,300	110,345,000	118.9
1903.....	953,600	110,277,000	115.6

"In the ten years from 1890 to 1900 the population increased 32 per cent, the consumption per capita 54 per cent and the total consumption 104 per cent. In the whole thirteen years covered by the table the population increased 44 per cent, the consumption per capita increased 59 per cent and the total consumption increased 129 per cent. This increase which has taken place in the Boston Metropolitan District is by no means unusual in other large cities, except that the increase in consumption is generally more rapid. The

Footnote, continued.

statistics which I have at hand for these cities cover nearly all the years up to 1893, but I have also for most of the places the statistics for the year 1902. They show, in several cases, a comparatively slow rate of increase in consumption until the rate per capita is about the same as it was in San Francisco two or three years ago, say 72 gallons per capita, and thereafter, as a rule, they have shown a very rapid increase in the consumption of water per capita. As instances, I will give you the following: Chicago reached this consumption of 72 gallons per capita in 1870, increased to 100 gallons per capita in 1875 and reached 147 gallons per capita in 1893 and 159 gallons per capita in 1902. Philadelphia reached the consumption of 72 gallons per capita in 1881, and increased to 150 gallons per capita twelve years later, in 1893, and reached a consumption of 233 gallons per capita in 1902. Brooklyn, New York, reached the consumption of 72 gallons per capita in 1891, and two years later was using 86 gallons per capita. St. Louis reached the 72 gallons per capita in 1886; in 1893, only seven years later, it was using 96 gallons per capita, and in 1902 134 gallons per capita. The above cities are all larger than San Francisco. Cincinnati, which in 1890 had substantially the same population as San Francisco, reached the 72-gallon rate in 1886, and in 1893 was consuming 124 gallons per capita; in 1902 it consumed 125 gallons per capita. Cleveland, which in 1890 was only a little smaller than San Francisco, reached the 72-gallon rate in 1881, and was consuming 130 gallons per capita in 1893 and 165 gallons per capita in 1902. Detroit, which is somewhat smaller, reached the 72-gallon rate in 1871, and in 1875 was consuming 120 gallons per capita; in 1888 it was consuming 204 gallons per capita, and in 1893 it had decreased to 148 gallons per capita. In 1902 the rate was 157 gallons per capita. Milwaukee, which is a still smaller city, reached the 72-gallon rate in 1877, and in 1882, only five years later, was consuming 114 gallons per capita. In 1893 it was consuming 108 gallons, and in 1902 had diminished to 81 gallons."

Q. "From your investigations and studies of this subject and your experience, what would you estimate would be the consumption in San Francisco in the year 1910, daily?"

"I estimate the consumption at that date at 45,000,000 gallons per day."

Q. "Will you give your reasons for that estimate?"

"It is based upon the rate at which the consumption of water has increased in San Francisco in recent years, taken in connection with the past experience of other large cities. The consumption of water in San Francisco during the year 1904 is shown by the record to be 33,820,000 gallons. During the two years from 1902 to 1904 the increase per year in the daily rate of consumption was substantially 3,000,000 gallons. If this same rate of increase were to continue for the six years from 1904 to 1910, the consumption in 1910 would be, taking the nearest million gallons, 52,000,000 gallons per

Footnote, continued.

day. Making a similar estimate, based upon the increase in the water consumption from 1900 to 1904, which was at the rate of 1,800,000 gallons per day for each year, the consumption in 1910 would be 45,000,000 gallons per day. The increase in the water consumption in the six years from 1898 to 1904 was, as a total, 10,600,000 gallons per day, and the same increase in the next six years would make the consumption in 1910 43,000,000 gallons per day. Another mode of reckoning the probable increase in water consumption is percentages, instead of using the foregoing method, and, within limits, it is probably more accurate. The increase in the consumption in the six years from 1898 to 1904 was 45 per cent. And if the consumption increased in the next six years by the same percentage, the consumption in 1910 would be 49,000,000 gallons per day. From all the foregoing figures it has seemed to me that it would be conservative to estimate the consumption in 1910 at 45,000,000 gallons per day. I have estimated the consumption in 1930 at 90,000,000 gallons per day." (pp. 4220-24.)

Mr. Hering also testified that he considered Mr. Grunsky's estimate too low, saying that he based his opinion on his own judgment: (p. 3785.)

"I have done that in a great many cases in the larger cities of the United States, and I used my judgment entirely that the estimate was under, and in fact it was already under when I was here. He (Mr. Grunsky) had made the prognostications a year or two before, and it was already found erroneous then and it is decidedly erroneous to-day and getting more so."

Mr. Hering also testified: (p. 3789.)

"My judgment was based upon the study that I have made of the growth of cities for about fifteen or twenty years. I applied that judgment. Cities are grouped into different classes, if you want to group them, and you can see that certain cities, with certain characteristics, have a certain curvature of growth; others have another curvature of growth. I illustrated that in my Chicago report. I divided the cities that I examined then at that time, which was in 1885, into progressive cities, conservative cities, and, I think, there was another class. Those cities that owe their growth to the fact that they are government centers and grow, as most of our capitals have grown, irrespective of other causes, and as the city of Washington has grown, namely, almost directly in proportion to the population which is representative of the States or the United States; for instance, the city of Washington has grown as the country has grown. I should say that Mr. Grunsky's estimate of population, from my knowledge thus gained, was under what it is going to be. San Francisco is going to grow materially more rapidly; in fact I stated to some one—to whom I do not know—that I thought Mr. Schussler's curve was under rather than over, and I am prepared to make that statement again. We will see in five years who is correct.

Footnote, continued.

(At p. 3790):

"I did not consider that the growth of San Francisco was to be affected by what causes the growth of many cities—manufacturing interests. San Francisco, in my opinion, will grow more in relation to the development of commerce than in relation to manufacturing. I weighed that element more than any other; that the commerce of San Francisco is going to grow I am confident of.

"There is a cause of growth in California that is certainly well known in the East if it is not known here, and I presume it is known here, and that is that it is a very attractive State to live in, and many persons come here not only for their health, but because they prefer to live here on account of the climate."

Mr. Adams testified (p. 4679) in reference to Mr. Schussler's estimates of future consumption:

"I regard them as conservative, as already pointed out, in the sense that the actual amount required is more likely to exceed than fall short of the amount which he estimates as being sufficient. Especially do I regard this as being the case in his assumption as to the probable per capita consumption of water."

Mr. Schuyler testified with reference to Mr. Schussler's estimate as to future consumption: (p. 5403.)

"I regard Mr. Schussler's estimate as entirely conservative. The increase of consumption, as shown by his testimony, from 1900 to the beginning of 1905 was from 25,470,000 gallons daily to 33,820,000 gallons daily, a total daily increase in five years of 8,350,000 gallons. Assuming only that this rate of increase continues for the next five years without increment, although we may expect a constant increment in consumption, we should have, in 1910, a daily consumption of 42,170,000 gallons. Mr. Schussler's forecast for 1910 is but 40,000,000, which is apparently quite conservative."

Q. (p. 5404.) "From your experience in reference to water consumption, what would be your estimate of the per capita consumption in this city for the next ten years?"

"I am inclined to place it somewhat in excess of 80 gallons per capita in the light of the figures quoted in the answer to the last question. I have used Mr. Schussler's figures, however, in my computation, which are 80 gallons per capita for the period up to 1910.

"I do not think the rate of consumption can be less than that given by Mr. Schussler, and may be greater.

"I attribute the lesser consumption in San Francisco as compared with the Eastern cities chiefly to the fact that San Francisco enjoys a very much cooler climate in summer than the Eastern cities, and a more temperate climate in winter. The tendency of

It is therefore necessary for complainant to be prepared for a material increase in water consumption. The growth of population in San Francisco and the vicinity has been rapid. Through the development of transportation facilities outlying districts formerly available for water supply have become suburbs of the city. This condition has made it an economy to buy properties from 5 to 15 years in advance of their probable need as a source of water supply for the city.*

Footnote, continued.

excessive heat in the East is to produce a great rise in the consumption of water, and excessive cold also has a similar effect, as it is the general practice to open the faucets and allow a considerable waste in order to prevent freezing. Another factor which is of considerable moment is that San Francisco's location is so circumscribed and it is so compactly built and its climate is such that there is no large use of water in the cultivation of gardens and lawns, as in very many of the Eastern cities, and there are fewer parks in San Francisco supplied by the municipal water system. Again, the population of San Francisco—the business population—to a large extent has its dwelling place in surrounding towns, and the city does not really contain within its corporate limits the actual population which belongs to it and which would be represented in the census of ordinary Eastern cities otherwise situated."

* Mr. Schuyler testified as to purchases in advance: (p. 5432.)

Q. "How long in advance, in your opinion, is it the duty of a company supplying a municipality with water to prepare for future necessities?"

"A sufficient length of time to be reasonably certain that they may from some one of its undeveloped sources develop and deliver an additional supply to the city. This will be a variable period, according to the nature and extent of the development selected to be carried out in any one case; but prudence dictates that the company should not wait until the limit of its resources is reached before beginning the development of future water supply. This applies merely to the necessary preparation for the construction of works on sources already secured. The provision of sources of supply should anticipate the future as far as the resources of the company will reasonably admit without excessive outlays. Even a century may not be too great to look ahead where water is particularly scarce and where substitutional systems would be more expensive.

Footnote, continued.

"Inasmuch as the water company is the sole purveyor of this indispensable element to the city, it has necessarily assumed the responsibility of maintaining the supply equal and safely in excess of the probable demand, whatever that may be. Should they permit a shortage to occur at any time by neglecting to make such ample provisions well in advance, they would be guilty of the violation of a trust, the consequences of which would be so serious to the city and of such grave import as to render them liable to severe penalty, which might be no less than the forfeiture of their franchise. Realizing the gravity of this trust, the company must look far into the future and secure such properties as are necessary for the development of the supply of the future, and the further ahead they look the cheaper can these properties be obtained. As these properties, when purchased, become henceforth devoted to the uses of the future, and cannot be put to any other useful or profitable purposes, the *capital tied up in them effectively becomes a part of the general investment made for the city, and is entitled to be considered in fixing rates quite as much as that expended in works of construction.*" (p. 5438.)

"I do not consider that it was unjustifiable or unbusinesslike or unnecessary to acquire all the properties necessary to be unified into one general system as it was feasible to acquire them. All water properties are constantly increasing in value, and it is a measure of economy and business prudence to purchase them at as early a date as possible when the company's plans have been sufficiently developed to render it reasonably certain that such properties will be required as a portion of the future system. I certainly think that the properties which are not in use, but which have been acquired for future use, should be taken into consideration and valued as much as any other necessary portion of the plant. The property is essential to the future of the city, and it is the duty of the company to acquire such property, and it would be delinquent in its duty to the city if it did not expend the money of the company in the acquisition of such properties as will be needed at a period more or less within the near future. I therefore think that all such properties on which money has been expended for the protection of the city and its future water supply should be valued as a portion of the constructed works as much as though they were in use." (p. 5433.)

Mr. Stearns testified: (p. 4214.)

"In view of the scarcity of water producing properties and reservoir sites within a reasonable distance from San Francisco and the large quantity of water that will be required for the city within a reasonable time in the future, it is important that the more important water properties and reservoir sites should be purchased from 25 to 50 years in advance. Having these properties, the actual construction of works needs to proceed only at such a

Complainant's Exhibit 85 shows the probable growth of San Francisco and its vicinity. In order to take care of this growth complainant is prepared to erect the Calaveras dam on its water-shed in Alameda County, by which a storage reservoir of 30,000 million gallons capacity would be created, and thereby a supply of 30,000,000 gallons a day would be added to complainant's present supply of about 35,000,000 gallons daily. This reservoir need not be built to its full height at once, but could be developed gradually as the needs of San Francisco required.*

Footnote, continued.

rate as to provide sufficiently far ahead of present needs so that there will be no deficiency in the water supply. Beyond this requirement that the water supply must be kept sufficient, there is no inflexible rule, and the determination as to additional works should be based largely upon economic grounds. For instance, it may be determined by estimates that it is true economy to build a large storage reservoir or tunnel or pipe which will serve for many years because the large work can be built at a smaller cost per unit of capacity, or it may be determined in the same way that true economy requires the building of smaller works which will soon require additions, or even the building of works to be subsequently abandoned, as, by so doing, it may be possible to avoid the high interest charges which would result from building works of great capacity before they are necessary."

* Mr. Schussler's testimony (p. 298) gives the relative number of gallons that will be held by this reservoir, dependent upon its height above the elevation of the sea:

Elevation.	Contents.
585 feet	27,000,000 gallons
615 feet	511,000,000 "
685 feet	9,498,000,000 "
745 feet	30,351,000,000 "

And the dam will be from 215 to 220 feet from the lowest base of its bedrock foundation to the level of its overflow.

Similarly the San Antonio Creek properties can be developed gradually. (p. 299.)

Similarly the Portola reservoir can be developed to take San Francisco Creek somewhere west of Menlo Park, and also by the con-

The problem of providing for this increased consumption and the manner of meeting it is shown in Mr. Schussler's testimony, as follows (p. 153):

"The prime basis of such prognostication is the probable population which you may expect. The second factor is the probable daily per capita consumption per inhabitant. Therefore where from our present records we are led to assume, with considerable degree of safety, that the population of San Francisco now is conservatively estimated at 440,000, it is not very much out of the way to assume that in the year 1910 there will be a population here of 500,000 inhabitants; that in the year 1920 there will be a population of 650,000 inhabitants; that in the year 1930 there will be a population of 800,000 inhabitants; that in the year 1940 there will be a population of 950,000 inhabitants, and that in the year 1950 there will be a population in San Francisco of 1,100,000 inhabitants. Now, as heretofore stated, in the year 1900, by our computation, the population of San Francisco was about 355,000 inhabitants. Their average per capita use or consumption was 72 gallons per head per day. At present the consumption through the year will be an average of 33,000,000 or 33,500,000 gallons a day, averaging the past seven months with the probable consumption of the coming five months, which would make for a population of 440,000 inhabitants—that we have every reason to believe now to be the population of San Francisco—a daily per capita consumption to-day of about 76 gallons. So that even with the rapid growth of population as assumed by us from our data during the past five years of from 355,000 in 1900 to 440,000 in 1904, the daily per capita consumption has also increased

Footnote, continued.

struction of a tunnel can be made to catch the coast streams, the Pescadero and San Gregorio. (p. 301.)

At 90 feet elevation the Portola dam will contain 3203 million gallons.

All the dams and the relative heights to which they can be raised are shown in Mr Schussler's testimony. (pp. 287-304.)

from 72 gallons per head in 1900 to about 76 gallons per head in 1904. If, therefore, based upon our past experience with the gradual growth of per capita consumption growing with the growth of the population, and furthermore based upon the experience of most of the eastern cities that with the growth of population also grows the per capita consumption, it is not much out of the way to assume that the per capita consumption having been in 1900 72 gallons and being in 1904 very nearly 76 gallons per head, that in 1910 it is most likely to be not far from 80 gallons per head. Assuming after that an even more reasonable or slower rate of increase in the per capita consumption, which can only be achieved and controlled by very careful inspection and stoppage of waste and leaks, that assuming that the per capita consumption from 1910 where it is figured at 80 gallons would grow only to 85 gallons per head in 1920, to 90 gallons per head in 1930, to 95 gallons per head in 1940 and to 100 gallons per head in 1950, when we assume this city to have reached beyond one million inhabitants, or, as this table shows, 1,100,000 inhabitants. The factors therefore herein exhibited for future prognostication of the future growth of the consumption of water in this city for domestic purposes—domestic and other purposes—being the population and the per capita consumption, brings about the following prognosticated table of future increase in the daily consumption: For the year 1910, the population taken at a conservative figure of 500,000 inhabitants, with a per capita consumption of 80 gallons per head, would make the daily total consumption, on an average, 40,000,000 gallons a day. That of course means that more water than that has to be provided, as the daily fluctuation and the monthly fluctuation in the daily consumption runs some months as far as 30% or 35%; that is, that the smallest day in the year or the month is sometimes exceeded by the biggest day's consumption in the year or the month by from 25 to 30 and more per cent. Therefore in the method of conducting the water to the city, as well as in the storage capacities in or near the city, the proviso

has to be made that those maxima of the daily consumption have to be met, just as well as the minima and the average. Now I will go on with the table of population and probable consumption: For the year 1920, having placed the population at 650,000 inhabitants and the daily consumption at 85 gallons per capita, it makes the daily average annual consumption 55,250,000 gallons a day, or fully 55,000,000 gallons a day, which means that proviso should be made for conducting water into this city and being ready to supply a daily average maximum of at least 70,000,000 gallons a day when your average daily consumption is 55,000,000 or a little over. For the year 1930 the figure of population is placed at 800,000, while the daily per capita consumption is placed at 90 gallons. This produces a daily average consumption through the year of 72,000,000 gallons a day. In 1930, which is only a little more than a quarter of a century distant, that will be the situation. Now to allow for the maxima supply during the summer draught, which is much greater than during the winter, the daily capacity should be somewhere in the neighborhood of 90,000,000 gallons a day so as to allow that the maximum summer supply can be run into town steadily and constantly either by additional conduits or by largely increased storage for water in or near the city. In 1940 the population is placed at 950,000 inhabitants. The daily per capita consumption is placed at 95 gallons, which makes a total daily consumption of 90,250,000 gallons a day, or a little over 90,000,000 gallons a day, which again means that somewhere near from 25% to 30% extra capacity should be provided to take care of the summer maximum supply. For the year 1950 the population is placed at 1,100,000 inhabitants, and the daily per capita consumption is placed at 100 gallons, which makes the total daily consumption of water for the year 1950 110,000,000 gallons a day, which of course in turn would require a considerable additional percentage of conveying capacity or storage capacity in or near the city to take care of the maximum.

11. HOW COAST STREAMS COULD BE CONNECTED.

If, however, the company did not see fit to go to the additional expense of bringing the water from the Alameda system, which ordinarily would be deemed advisable because the source could be developed so gradually, it could develop and connect the Crystal Springs reservoir with the next series of creeks to the south by means of the Portola reservoir. Or both could be developed simultaneously in case of a growth of population from an unexpected cause.

Mr. Schussler testified: (p. 280)

"The area that is available to carry off the coast stream waters and deposit them in the great Crystal Springs gathering reservoir * * * is somewhat over 60 square miles, with a tributary area, marked 'D' on Exhibit No. 3, of 26 square miles. * * * The Company owns something over 900 acres surrounding the Portola reservoir. On the coast stream it owns land something over a square mile; but they own water rights on those streams which enable us to carry off, not only the freshet waters, but also to take the summer supply as well. * * * (283) We cannot expect to get as great a percentage of utilization * * * from the watershed of these coast streams as we can and do from the well husbanded water sources of Pilarcitos and San Andres, unless we construct a very large conduit or tunnel from the coast range and into, perhaps, the Portola reservoir; that tunnel will be in the neighborhood of six miles in length. * * * When it is finished and then supplemented by a comparatively small reservoir on the San Gregorio, at an elevation of 400 feet above tide, and a similar one on the Pescadero at a somewhat higher elevation, and a large capacious conduit from the Pescadero to the San Gregorio storm reservoir, car-

rying water from the former into the latter, and then the two joint waters being carried by the six-mile tunnel into the Portola reservoir, which will have its storage capacity increased to over three thousand million gallons, * * * there is no doubt in my mind but that from twenty-five million to thirty million gallons a day average can be obtained from that coast stream region, regardless of the water that can be additionally accumulated by the tributary watershed of the Portola reservoir, * * * in addition to what the three present Peninsulas produce net." (p. 284.)*

* The several experts have testified with reference to the capacity of complainant's property to expand.

Mr. Adams testified: (p. 4704.)

"I am impressed with the idea that the entire plant has been acquired and built up in a manner exceptionally well suited to the securing of increases in supply from time to time, as may be required, at the least possible expenditure of money and time. The plant as a whole admits of a very large increase in its present yielding capacity. I have not attempted to make a determination of the maximum amount which it might be made capable of producing, having pursued my inquiry to the point of satisfying myself that this amount is in excess of 95,000,000 gallons per day. It seems unnecessary to inquire farther into this point, the prime purpose of my inquiry being the ascertainment whether or not the company had properly and fully discharged its duty in safeguarding the future of this city as to the increased water supply which it will require. To enumerate the most important opportunities which the property presents for an extension of its water supplies I am of the opinion that the utilization of the coast streams, in conjunction with the lower Crystal Springs reservoir, can be made to yield 23,000,000 gallons daily. From Portola can be secured a total of 8,000,000 gallons daily. From Calaveras can be secured a safe additional supply of not less than 25,000,000 gallons daily. From the proposed reservoir on the San Antonio Creek, without the utilization of the Arroyo Valle, which may be diverted to San Antonio Creek above the proposed reservoir, about 8,000,000 gallons daily can be secured, making a total of 64,000,000 gallons, from which must be deducted 4,000,000 gallons to supply the requirements of Stanford University, and because of the decreased summer flow at Sunol likely to follow the storage of water at Calaveras and on the San Antonio Creek. This remaining amount, 60,000,000 gallons per day, when added to the 35,500,000 gallons which the present works are able to supply, makes a total of 95,500,000 gallons daily which the works are capable of supplying when they are farther extended as indicated. By the fullest possible development of the

Footnote, continued.

Alameda Creek system it may be possible to materially increase this amount. To just what extent, as stated before, it does not seem to me important to inquire, and I have not inquired."

"It is the imperative duty of a water company undertaking the supplying of a community with water to make adequate provision for future growth. Unless such provision is made disastrous results are certain to follow." (p. 4705, Adams.)

"In the case of San Francisco, located in a section of the country where water is in great demand for irrigation and other purposes, and where that demand promises the speedy appropriation of all desirable sources, it is of the utmost importance that a company, or whoever is charged with supplying the city with water, should anticipate the future for quite a long period of time. I should say that such anticipation should, if possible, not cover a period of less than fifty years, and, preferably, in excess thereof." (p. 4705, Adams.)

Q. (p. 4706.) "I would ask your opinion as to whether or not properties acquired which are adapted for future use ought to be the subject of valuation or ought to be taken into consideration in valuing the company's plant?"

A. *"They certainly should be taken into consideration, because their acquisition rests upon the plain duty of the company. I do not, therefore, see how they can be fairly omitted from consideration in determining value."*

Mr. Schuyler testified: (p. 5434.)

"My opinion of the entire system as a whole, as I have examined it and described it in detail, is that it is most admirably adapted to the present and future necessities of a water supply for the city and county of San Francisco; that water of great abundance, sufficient for the needs of the city, can be developed from these various sources and is at hand ready to be developed at any time it may require. It is the supply which is within closest proximity to the city. In quality it is in every way suitable and sufficient. In the matter of economy the works can be constructed for very much less than any substitutional plant can be built in supplying an equal quantity of water. By reason of their proximity they will always have a greater measure of safety and reliability than any plant which might be built from a more distant source. *So that in every respect and from every point of view I consider that the present plant and the sources of supply from which the future is to be drawn is adequate in quantity, is satisfactory in quality and has a greater degree of reliability, safety and economy than any other substitute which is possible to be brought to the city."*

(P. 5430.) "The plant of the Spring Valley Water Company is so designed as to admit of extension and expansion in numerous directions at a minimum of cost and without an excessive expenditure of capital which might be required to lie idle. The plant in

Footnote, continued.

very many ways and directions can be enlarged to supply the growing needs of the city at moderate expense and within reasonable periods of time. This is particularly true of the Crystal Springs dam, which can be increased in height in a moderately short time to give more than double its present capacity and enable it to receive the excess of supply now going to waste in the San Francisquito Creek, past the Portola system, and also to receive the waters which are to be gathered and developed from the coast streams, the Purissima, the San Gregorio and the Pescadero. It can also be made to receive water from the Alameda Creek system by a gravity conduit to be built through a tunnel under the bay. The Calaveras reservoir can also be constructed within a reasonable period of time, as well as the proposed San Antonio reservoir. It is possible that there may be some considerable extension practicable for the Pleasanton system of artesian wells and the Sunol gravel beds to afford an additional water supply with small expense. These various sources are each capable of development independently or simultaneously as the occasion may require. *They may be developed partially, a little at a time, or completely.* It is feasible, for instance, to add to the Crystal Springs dam fifteen or twenty feet and use the reservoir at that height without completing it to its ultimate height, thus saving the outlay until the time for the necessity of its use were nearer at hand." (p. 5430.)

(P. 5431.) "The undeveloped supply controlled by the company, to be drawn upon in future, as needed by the construction of the necessary conduits and reservoirs, is conservatively estimated as follows:

"From the watersheds of the coast streams the following areas are above the level of the conduit required to deliver water to Crystal Springs reservoir, viz.:

Pescadero Creek	28.5	square miles
San Gregorio Creek	31.1	" "
Purissima	5.5	" "

Total available water-sheds of the
coast streams 65.1 square miles

"On this area, as shown by the precipitation records, the mean rainfall since 1889 has been 53.67 inches. Assuming an average run-off of 30 per cent of this rainfall and a catchment of two-thirds of the annual run-off—figures which are quite conservative—the mean supply thus derived would be 12,100 million gallons per annum, or 33,000,000 gallons per day. This supply may be conveyed to the Crystal Springs reservoir and there stored when that reservoir shall have been completed to its ultimate capacity. To this 33,000,000 gallons may be added 4,000,000 gallons, which is one-half the yielding capacity of the San Francisquito Creek belonging to the Spring

Footnote, continued.

Valley Water Company, the other half, or about 2,500,000 gallons, pertaining to the Stanford University. On the Alameda Creek system: The proposed Calaveras reservoir, with a drainage area of 139 square miles, has a total capacity of 30,531 million gallons at the 160-foot contour of the base, and has an average yielding capacity of about 25,000,000 gallons per day. The proposed San Antonio reservoir, with a total drainage area of 46 square miles, and a storage capacity of 9,627 million gallons, at a height of 120 feet above base, has an average yielding capacity of about 8,000,000 gallons per day, as determined from the precipitation records. *The total of these resources as yet undeveloped, and heretofore described, is 70,000,000 gallons daily, which, added to the 37,700,000 gallons now available and ready for use, indicates that the company can supply in excess of 107,000,000 gallons per day when the demands will arise.* Mr. Schussler, prognosticating the probable future demand, estimates the population of San Francisco in the year 1940 at 950,000, with a probable consumption of 90,250,000 gallons daily; and in the year 1950 the curve of probable growth of the city places the population at 1,100,000, consuming 110,000,000 gallons of water daily; intermediate between these dates the consumption will have reached the supply which is evident can be secured from the sources named." (p. 5431.)

"It is the duty of a company supplying a municipality with water to prepare for future necessities a sufficient length of time in advance to be reasonably certain that they may from some one of its undeveloped sources develop and deliver an additional supply to the city. This will be a variable period according to the nature and extent of the development selected to be carried out in any one case, but prudence dictates that the company should not wait until the limit of its resources is reached before beginning the development of future water supply. This applies merely to the necessary preparation for the construction of works on sources already secured. The provision of sources of supply should anticipate the future as far as the resources of the company will reasonably admit without excessive outlays. Even a century may not be too great to look ahead where water is particularly scarce and where substitutional systems would be more expensive." (p. 5432.)

Mr. Stearns testified (p. 4390):

"There is a chance to get ground water, I believe, from the Niles cone, and probably from the easterly side of the bay; there is a chance to get additional water from the coast streams. Having additional sources of supply more water can be stored and utilized by raising the Crystal Springs dam, and there is a chance of adding water from the San Francisquito Creek, on which the Portola reservoir is situated, or on a branch of it. Then there are other opportunities, but I think they are not considered in connection with the

12. PROPERTY MAINTAINED BY COMPLAINANT AS INSURANCE OF CONTINUITY OF SUPPLY BY TIMELY ACQUISITION OF WATERSHEDS AND BY INTERCHANGEABILITY, DUPLICATION AND THE LIKE.

"A company which seeks and obtains a franchise to supply a certain territory with water for public and domestic uses is under a moral, and in my judgment a legal obligation, to furnish a supply which shall be equal to all emergencies which may be reasonably anticipated, including unusual droughts and unusual conflagrations, and to bear constantly in mind the prospective increase in population and a consequent increased demand for water."

Long Branch Commission v. Tintern Manor Water Co., 62 Atl. 474-476;

Olmstead v. Morris Aqueduct, 47 N. J. L. 311, 329.

In order to be prepared for such emergencies, which might arise through any portion of its system becoming temporarily deranged, the complainant has established a system of interlacing of its pipes and reservoirs, which is shown in its Exhibits 22, 23, 24 and 25. Mr. Stearns says of this system:

"Q. In a municipal water supply, I ask your opinion upon this proposition: Is there any relative advantage

Footnote, continued.

present case, nor are they properties, so far as I know, of the Spring Valley Water Company as such."

To bring water from Calaveras Mr. Stearns proposed to build a tunnel under the bay at Dumbarton at a cost of \$11,440,000 for tunnel, dams, and conduits for 30,000,000 gallons daily increase. (p. 4400.)

in a system that receives its water from different sources which are capable of a separate or a united utilization; that is to say, are capable of an interchangeable supply in the matter of distribution and distributive capacity?

"A. In the case of any large city there are decided advantages in having different sources instead of a single source, for three reasons: first, the greater certainty of a supply taken from several sources; second, the opportunity which may be afforded to obtain a part of the supply by gravity when the whole cannot be so obtained; third, the opportunity to discontinue the use of a source temporarily in some cases when the quality of the water is unsatisfactory. The works for pumping and conveying water from several sources are naturally more widely separated than those from one source and, with proper provision for interchangeability, are therefore more certain to provide a continuous supply. These advantages justify a considerable expenditure to obtain different sources with separate conveying systems made interchangeable." (p. 4213.)

For similar reasons the pumping plants at Belmont and Millbrae are maintained as duplicates, so that one will be able to keep up the supply of water if the other breaks down.

For similar reasons complainant has built all of its structures of the highest class material.

For similar reasons, whenever one aqueduct is so situated that if it broke the water supply would be materially affected, another aqueduct is so established that it can be drawn on for water supply while repairs are being made. This is notably the case with the Niles bed-rock dam and flume in Alameda.

The relative values of the elements of safety both by way of duplication and by substitutes, is shown to be of a high character by the testimony of experts.

Mr. Hering said, concerning the extra care and cost of complainant's pipes (p. 3413):

"I should consider this additional cost entirely justified, as it exemplifies good business principles. I think it is absolutely essential to have sufficient safeguards thrown around a system of water works for a large city so that it is practically impossible that it ever be subjected to the calamity of furnishing no water. Therefore it is best to design the works so that any one part, be it reservoir or pipe line or pump, may be put out of service, either on account of accident or for repairs or for cleaning or for other purposes, and yet not interfere with the regular supply or at least a sufficient supply for all usual purposes; I should say that all those parts should be duplicated, which will guarantee a necessary supply of water at all times."

And, again, he said, of Portola dam and reservoir:

"I am of the opinion that the nearness of the site and the amount of water there to be obtained were of sufficient value to have secured the rights for the purposes of supplying this city with water before the present time." (p. 3446.)

In reference to the Niles bed-rock dam he said:

"In view of the fact that this bed-rock dam and the flume leading therefrom connect with the pipe line leading to San Francisco, and can therefore at any time be used to supply water to the city, should the only other existing tunnels, flumes and pipe lines to the point of connection from Alameda Creek be accidentally disturbed, I believe that as a duplicate or safeguard this bed-rock dam and the flume have and should have a proper value attached to them. (p. 3446.)

"While this bed-rock dam is not always in use, I do know that it is an alternate supply which I think it is always valuable to have. I do not consider it worth to this project of supplying the city all that it would cost to build, but it has some value, and therefore when I

considered this I could only use my judgment and I estimated it at half the value it would cost to reconstruct it to-day." (p. 3762.)

Again Mr. Hering testified:

"I consider the factors of safety that have been arranged between these three reservoirs (referring to the three large reservoirs on the Peninsula) are very good, so that one pipe line can go out of service and yet the city can be supplied with water. I think the Peninsula system is characterized partly by its great safety." (p. 3771.)

In reference to Lake Merced Mr. Hering said (p. 3727):

"I assumed, in comparison with other cities, that it would be very desirable and very valuable to have a large distributing reservoir as near as practicable to so large and important a city nearly surrounded by salt water. I assumed that at the present time it would be fair to consider a distributing reservoir to the extent of 500,000,000 gallons. The lake holds much more as a storage reservoir, but I thought it was fair and rational to estimate a part of this, let us say, as having a value for a distributing reservoir, such as our Eastern cities are getting, sometimes at a very high figure because gotten too late.

Mr. Stearns testified as to the justification of using the best materials (p. 4210):

* * * "Parts of works which may fail or be thrown out of service for repairs should be duplicated, unless provision is otherwise made for keeping up the supply when such parts art out of use. * * * The character of the construction in all important features should be such as to reduce the chances of failure to a minimum. * * * All of the essential parts of a water works should be built in such a way that it will be almost impossible for any failure to occur. More-

over, in many parts of the system first-class work will be found cheaper than any other kind, on account of its greater durability and smaller cost for repairs. I may also add, in the case of city water pipes, that first-class work will prevent the leakage of water from them." (p. 4211.)

On cross-examination he said (p. 4494) :

"Throughout a whole system of water works nobody who is wise would ever build for the needs of the present year. If you lay a pipe in the street or build a pumping station and build it only for the present year and have to put in a new one the next year it will involve such great expense that any one doing the work would be justly criticised. True economy means taking into account in building works what the cost of works will be for a term of years, taking into account the first cost and interest and depreciation or sinking fund, or whatever it may be termed. It is certainly judicious to build works that are in excess of the needs of the times, so that they will not have to be increased at a much greater total expenditure than if they were built large in the beginning."

Mr. Schuyler testified (p. 5433) :

"All water properties are constantly increasing in value, and it is a measure of economy and business prudence to purchase them at as early a date as possible when the company's plans have been sufficiently developed to render it reasonably certain that such properties will be required as a portion of the future system. I certainly think they should be taken into consideration and valued as much as any other necessary portion of the plant. The property is essential to the future of the city and it is the duty of the company to acquire such property, and it would be delinquent in its duty to the city if it did not expend the money of the company in the acquisition of such properties as will be needed at a period more or less within the near future."

With reference to the Niles bed-rock dam Mr. Schuyler testified:

"I think it has as much value now as it originally had and should be included. It stands ready for use at any moment in case there is a break in the Sunol aqueduct above, and it will always, when required to do so, divert water through a connecting pipe line to the main Alameda pipe line, as it originally did, by opening of a gate. The dam is also used at present for the purpose of diverting and delivering water to former owners of riparian rights below, which rights were purchased by the company, the arrangement being a part of the compensation paid in compliance with the terms of the contract by which these rights were alienated from the land and secured to the company." (pp. 5442-3.)

Again:

"Duplicate systems are safer in direct ratio to their number, because they necessarily, or generally do, occupy lines widely diverging and spreading over different character of country, and no convulsion of nature, such as a cloud-burst or an earthquake, would be likely to break them all at any one time, nor would the lack of rainfall felt on any one watershed be likely to be felt on them all alike." (p. 5400.)

Mr. Adams testified (p. 4659):

"I find that the greatest precaution, and a commendable precaution, has been taken on the part of the designing engineer, to so interconnect the various sources of supply that it is well-nigh impossible for any accident to any one part of the works to result in any interruption of service to any part of the city of San Francisco. * * * I do not know of any water supply system that equals in its quality of interchangeability and in the number of its various sources of supply, the properties and supply system of the complainant. I feel certain that there are none." * * *

13. WATER RIGHTS AND WATER SHEDS.

The complainant is the owner of all the water sheds in the immediate vicinity of San Francisco.

Its chief engineer has had but one lode-stone which led him in the development of his property. It is expressed by him in his testimony at p. 20:

"In establishing a municipal plant the main factor is to get a first-class quality of water, the second is an abundant quantity of water, the third is constancy and reliability of supply, first-class legal title to all the rights and properties connected with it, and then build first-class works." (p. 20.)

"Without legal title and absolute title to water rights and properties and reservoir sites and water sheds and to rights of way, or primarily to water rights or to the right to take the water from its natural source and conduct it away from that region to another place for other uses, you have to have an absolute title that can never be disturbed. Without that there is no use building works, if the title can be disturbed and you can be enjoined from the use of the water." (p. 22.)

"The most important title to acquire is the title at the point of diversion, and from there down stream as far as any rights exist. Thereafter, when that is acquired, then the title to the water should be acquired above the point of diversion to the various branches of the stream that make the main stream, so as to prevent the diversion from the upper portions of the water shed of any portion of the stream." (p. 24.)

"Therefore, based upon the prognosticated table of probable future increase in the supply of water, we have gone to work and made it a rule to acquire the rights first to the water and the properties necessary, particularly for storage and protection; for storage on the reservoir sites in the respective water sheds or adjacent and conveniently located to them; for protection to such portions of the adjacent water shed, and particularly

along the lines of the streams that feed such reservoir as are necessary to keep the water from pollution by habitation and the inhabitants that might come there." (p. 43.)

"In the case of the reservoir sites in San Mateo County, that were planned and constructed before the people residing in the water sheds knew the value of these water properties, we succeeded in getting a large portion of the water sheds into our absolute fee simple ownership. Later on, when the city authorities took it upon themselves to educate the people to the great value of these water works, and water privileges and reservoir sites, by the public investigations had in the City Hall, the increasing value of these properties became known to the owners, and therefore we were not able at that time in some of the instances across the bay to get as much of a proportion of the water sheds as we got on this side of the bay. Still we have purchased sufficient land to make the water supply safe as to quality. Every acre of land that surrounds the reservoirs and streams that we own now, and in connection with the supplying of the city of San Francisco, is useful and necessary. * * * It enabled us to cancel all the leases on the property, especially in the Alameda Creek region, and thereby save the water from being polluted." (pp. 44-46.)

"The consumption of water by this city is a positive thing; it is an absolute, cold fact, that the water must be here every day and every hour and every year. In order to have the absolute assurance and security that such is the case, that the water supply will be here at all times, it is absolutely necessary not only to build the works so as to be of reliable character, but you must also be free from interruption by accidents or by a flaw in the title, so that you might possibly not lose the right or lose one of the properties or valleys or one of the essential factors in the supply. It must be a constant supply, and it also must be reliable, which relates more to the character and to the reliability of the works." (p. 46.)

The success with which this was attained is shown by Mr. Schussler's subsequent testimony (p. 1538):

"The combination of the properties and works of the Spring Valley Water Company form one inseparable unit. All of the properties combined into one harmonious whole for the purpose for which they are being used and can be still further developed, are worth more than the separate value of each separate piece of property—whether water rights, reservoir site, water shed or right of way. One separate water right, for instance, on a stream, is worth comparatively little if it does not form one of the links in continuous and complete chain of water rights reaching from the headwaters down to salt water.

"So also is the sum of the values of a number of detached water rights to such stream far below their value if they were forming a portion of a completed chain of water rights, as the ownership of one or more detached and separate water rights would not entitle their owner to divert all of the water of the stream.

"The ownership of the water rights or riparian rights on a stream or water course gives the right to divert a portion or all of the water of a stream for the exclusive use of the owner and for such purpose as he intends to use the same. If a party owns all of the water rights to a stream or water course which runs fairly constantly during the entire year as a result of the rain falling on its water shed, he has the right to divert all such flowing waters from their course and use them. If, on the other hand, the water shed of the stream in question is subject to a variable rainfall during the year, as well as during a number of years, as is the case in California streams, often causing floods during and in consequence of the rainy seasons, while during the dry seasons the water flowing in the water courses runs down very low, the owner of the water rights of such stream or water course in order to utilize the same, in the absence of any natural lakes, has to construct storage reservoirs in which to husband and store the water product of such rainy seasons during and after the

periods of rainfall and storms, thus enabling him to distribute the waters thus caught and stored more evenly and uniformly over a longer period. If waters are to be used for irrigation purposes, the period of distribution of such stored waters is during the irrigation season, which in California is what is known as the dry season. If, on the other hand, the purpose of such water storage is for power development or for domestic supply, then the water is used with much more regularity during the entire year; in other words, the ownership of the water rights pertaining to the entire water product of the water shed and stream is the prime and fundamental condition before its waters can be diverted from the natural channel of such water course and utilized. Where, as on the Pacific Coast, the streams are all very variable, the owner of the water rights of the stream or streams that are to be developed and diverted for domestic supply purposes must acquire reservoir sites in or near the respective water sheds in which storage reservoirs have to be constructed in which to store the water product of the rainy seasons. The ownership of such reservoir sites, and the construction therein of reservoirs of abundant storage capacity, is the only means by which to change the excessively variable and unreliable streams into constant and reliable ones. Finally, if the water so owned and stored is to be used for domestic purposes, for the supply of cities or towns, or for the population of suburban or rural districts, then the water so stored must also be protected against pollution. The only absolutely safe and effective way of accomplishing this object is that the owner of the combined water rights and storage facilities also owns or controls the most prominent and essential portions of the water sheds tributary to such storage reservoirs, and by such ownership or control of these water sheds preventing the water from being made unfit for domestic purposes.

"The value of water rights pertaining to streams and water courses, the waters of which are used or to be used for domestic supply only, have a far greater value than for either irrigation or power purposes. At-

tempts have been made heretofore to estimate the value of such water rights, pertaining to waters used for domestic supply only, separately and independently from the value of the other necessary and essential properties, such as reservoir sites and water sheds.

"But, as in a domestic water supply system under the conditions existing on the Pacific Coast, the three main factors, namely, water rights, reservoir sites and water sheds, are so intimately interlaced and interwoven with each other, if any one of these three essential factors preventing the successful completion of the domestic supply system be lacking it is impossible to determine the separate value of any one of these three essentials independently from the other two.

"Through the many public discussions of these values during the past decade, as well as from the fact that the increase of population has fostered not only the growth of irrigation but also the needs of rapidly growing towns and cities, it has by this time become practically impossible to purchase water rights to streams independently from the lands to which such waters are tributary. In short, the value not only of water rights but also of reservoir sites and water sheds, since with the rapid increase of population these properties are much more appreciated and their values are better understood by their owners than in former years, have so increased in value that if nowadays it were attempted to purchase a continuous chain of water right properties, such as owned by the Spring Valley Water Company, the price to be paid for the same would be so high that it would in most cases prove more economical to purchase the lands out and out to which such water rights appertained.

"The reservoir sites also, which, under our climatic conditions, are an absolute necessity to a successful, reliable and constant domestic water supply, are very sparsely provided by nature; and as the good-sized reservoir sites are very few in number, and as their maximum capacity to which they can be developed is limited by natural conditions, their value for domestic purposes is very great, particularly if located within a

reasonable distance to a large center of population and if provided with water sheds from which either directly or indirectly such reservoirs can draw their supply. The very fact that the present or eventual capacities of such storage reservoirs have a natural and practical limit, while the population now and hereafter depending upon such storage reservoirs, as well as the demands for water to be supplied from them, is constantly on the increase, tends to constantly still more increase the importance and value of such reservoir sites in the future. As the population grows, and its demand for water grows with it, the fact that these large storage reservoirs are located near the growing cities, thus acting as storehouses in case of accidents to long conduit lines from distant sources and also to neutralize and overcome the effect of one or more dry seasons, the value of such sites has been continually growing in the past and will continue to grow still more rapidly in the future, particularly when compared with the enormous sums of money necessary to convey from the far distant Sierra Nevadas an amount of water equal to the present and future consumption of the city and region around the bay of San Francisco." (pp. 1538-42.)

VALUE OF COMPLAINANT'S RESERVOIRS, BECAUSE NOT
DUPLICATABLE IN THIS TERRITORY, RECOGNIZED
BY MR. GRUNSKY.

The highest compliment to the worth of complainant's reservoir sites and water sheds comes from the learned engineer who was taken from the position of city engineer of San Francisco to become one of the Panama Canal Commissioners. In speaking of reservoir sites, he said:

"There is difficulty in suggesting where this (the reservoir site for a mountain system) is to be found, if the territory now occupied by the Spring Valley

Water Works is not to be invaded. Possibly sufficient storage would ultimately be secured by combining many small, not naturally favorable sites, but this method would be alike undesirable and expensive. * * * The probable future addition of Lake Merced to any Sierra Nevada system would go far toward assuring the reliability of service." (p. 409.)

To a question asked him, whether he thought the meteorological conditions at or near San Francisco would warrant the company to provide for only twenty years in advance, he answered:

"A company that is to supply water for an indefinite period looks further into the future than that. But in planning such works as pipe line and the like it is not always necessary to look as far into the future in the matter of pipe line capacities, as it would be in the general scheme of expansion." (p. 381, Grunsky's testimony.)

"How far ahead the company ought to look will depend upon local conditions entirely, and upon the cost of acquisition of the properties. If it becomes apparent that some property that will produce water should come into use in the future, the steps towards its acquisition should be taken so long in advance of that acquisition that the property can be acquired without too great an expense. If the necessity is such that the property must be had it is always to be expected that more will have to be paid therefor." (p. 381, Grunsky.)

"The water that should actually be at the command of the company should certainly be sufficient for the community five years in the future. It is desirable that it should be a much longer period." (p. 382, Grunsky.)

"Fifty years might be a reasonable period for the municipality itself. In the case of a private company it is a difficult question to determine." (p. 382, Grunsky.)

Again, Mr. Grunsky testified that the value of the reservoir site lies

“in the opportunity to market the water that can be produced there, bringing it under control and putting it into pipes, and the delivery of it.”

VII. TUOLUMNE OR HETCH HETCHY SYSTEM.

1. GENERAL DESCRIPTION.
2. DIFFERENCES BETWEEN MR. GRUNSKY AND OTHER ENGINEERS DISCUSSED UNDER FOLLOWING HEADS:
 - (a) As to total effective quantity deliverable.
 - (b) As to time required to build.
 - (c) As to relative physical advantage of Spring Valley and Tuolumne project. Incidentally showing quality of Spring Valley water better than that deliverable by Tuolumne scheme.
 - (d) As to cost of Tuolumne project.
3. TABLE SHOWING ANNUAL COST OF WATER SUPPLY FROM TUOLUMNE RIVER FOR A SERIES OF YEARS—1910-1930.
4. SUMMARY OF VARIOUS ESTIMATES OF TWO-PIPE LINE.

I.—GENERAL DESCRIPTION.

As the Court points out in the San Diego case the method of valuation by ascertaining what it would cost to replace a water system is generally inapplicable to property of this kind. But happily, owing to the

peculiarity of San Francisco's charter, requiring inquiry into the cost of acquiring public utilities, we have a very good substitute for the method of ascertaining the cost of replacing such a system. That is to say, we are able to ascertain what would be the cost of a system which would produce the same amount of water. Ordinarily the problem of cost of making the original surveys on which such an estimate is based prevents any such research. But San Francisco has made such a research of the Tuolumne system, and for that reason engineering experts are able to give us the value of a system, not replacing the complainant's property in kind, that is to say, with the identical reservoirs and pumping stations, but replacing it by furnishing the same amount of water at the same place, viz.: on the county line between San Mateo County and San Francisco County. Mr. Hering, Mr. Schussler, Mr. Schuyler and Mr. Adams all use their own valuations of the Tuolumne properties as a means of ascertaining the relative value of the intangible properties, water rights and franchise of complainant. At one time Mr. Grunsky also was of the opinion that the method used by these engineers was proper and, in fact, used it himself, but subsequently he modified his judgment to the extent of saying: "I thought it was a valuable guide and an aid to forming an opinion. I have been confirmed in the conviction that the method pursued by me at that time was one that is not very reliable." (p. 331, Grunsky.) But Mr. Grunsky originally (all of the experts subsequently agreeing with him) found that the Tuolumne system was the best available out-

side source for the supplying of this city, conditioned upon the ability to obtain from the United States Government the rights necessary for the development of the water. (p. 359, Grunsky.)

Mr. Grunsky in his testimony fully described the Tuolumne project (at pp. 214-220, 230-266) and the proposed city distributing system (pp. 266-272). He also estimated the cost (pp. 272-280) at a total of \$39,531,000, summarized as follows:

Works for collection, storage and delivery of water.....	\$30,724,000.00
City distributing system.....	8,807,000.00
	<hr/>
	\$39,531,000.00

He estimated the cost of operation (p. 281) and other general costs (pp. 282, 283), and also gave the costs of renewals at various amounts at various stages (p. 284). He then discussed the relative status of the two propositions for the remainder of his report to p. 293. He then described Spring Valley works at pp. 306-12, and again took up the discussion at pp. 315 to 317. There are over forty detail sheets showing the proposed Tuolumne project already in evidence as part of the defendant's case. These were records of the City Engineer's office of San Francisco. The territory drained by the Tuolumne River is shown in complainant's Exhibit No. 15, where Mr. Schussler compares the northern portion of the San Joaquin valley with its possibility for irrigation to the irrigable plains of Lombardy, Italy. They are both drawn to the same scale, and both show water sheds tributary. Lombardy

is situated between the River Po and the crest of the Alps, Switzerland and Tyrol, and between the regions of Ticino and Mincio (p. 371, Schussler). The areas of the water sheds shown are practically the same. In one there are 90,000 inhabitants, in the other there are 3,713,000. This is all described at pp. 367-376 of Mr. Schussler's testimony.

Succinctly stated, the Tuolumne project involves the storage of flood waters of the Tuolumne River and its tributaries in the high Sierras. There are two reservoir sites, one at Lake Eleanor, with a net capacity of 15,500 million gallons, the other at Hetch Hetchy valley, with a net capacity of about 35,000 million gallons. It is proposed to utilize the Hetch Hetchy valley alone first, holding Lake Eleanor in reserve. The storage water when liberated is to flow down the channel of Tuolumne River about sixteen miles to a point just below its junction with Jaw Bone Creek. Thence it will be carried by tunnels and canal to the easterly edge of San Joaquin valley. The San Joaquin valley is to be crossed by two iron pipes, delivering the water to a pumping station near Altamont on the westerly edge of the valley. The water is then pumped over Altamont Pass and brought in two pipes around the southerly end of San Francisco Bay to San Francisco at an elevation of about 200 feet. The capacity of the pipe lines was placed at 30,000,000 gallons each per day. In addition to this pipe line at Belmont there is to be a reservoir, with a capacity of 3,000 million gallons, to afford storage near the city to provide for water in case of accident. The Belmont pumping sta-

tion is to have four pumps each with a capacity of 10 million gallons per day, to be entirely out of service except in emergency.

The water delivered by the pipes to San Francisco would enter two receiving reservoirs having a combined capacity of about 154,000,000 gallons. From these receiving reservoirs the water is to be distributed throughout San Francisco, reaching the low portions of the city by gravity, and being elevated to the higher portions by means of pumps at pumping stations suitably located. The distances and the heights to which the pipes deliver water at the various stages are graphically shown on complainant's profile map No. 2. The geographic and hydrographic conditions of the two schemes are set forth in such a way that the relative drainage areas can be seen, in complainant's Exhibit 3. These are both described in Mr. Schussler's testimony at pp. 97 and 99. The Tuolumne scheme involves a power station at Bear Gulch and a siphon to Dry Creek power station, and a pumping station at Altamont, with a net lift of 560 feet, and a tunnel from Livermore valley to Sunol valley, and another tunnel between San Francisco and San Mateo counties. The two pumping stations at Dry Creek and Altamont are to be run by electric power developed by the water of the project itself. The two supply pipe lines are to be 48 inches in diameter.

From the original or diverting dam the canal line is to be built along the bluff or bank of the Tuolumne River, partly in the shape of an open canal and partly in the shape of tunnels. On the route of this canal and

tunnel line the survey crosses two deep depressions which would probably be too extensive to cross by an aqueduct bridge. It is proposed to cross these by means of one or two pipe lines—so-called inverted siphons. Finally, after this combined canal, tunnel and pipe line has run in the neighborhood of 15 or 16 miles along the bluff, the water is to be taken, at an elevation of nearly 1800 feet, into two pipes called power pipes, exerting a pressure of 760 to 770 feet on the water wheels of the proposed electric power station. The power thus developed is to be sent by pole-line along the canyon of the Tuolumne River, over the hills and across the San Joaquin valley, to the proposed main Altamont pumping station. Meanwhile the water, after leaving the power plant at Bear Gulch power station, again continues toward San Francisco in the two 48-inch pipes.

The open, unlined canal is continued, partly on the side of a mountain until it enters tunnels and siphons, to Dry Creek, where there is a fall of about 330 feet, and where another power station would furnish electricity for the same purpose as the former one. Two iron pipes, each 48 inches in diameter, are to take the water from this station to the San Joaquin valley, on the west side of which is a pumping station at an elevation of about 180 feet above tide, and at which the water would be raised by electricity about 560 feet to the Altamont reservoir. From this reservoir the water is conducted by means of two 48-inch pipes through the Livermore valley, tunneling first into the Sunol valley and then into the Santa Clara valley, and finally

discharging in San Francisco at an elevation of about 200 feet above tide.

The distance of the proposed diversion from the Tuolumne River to the county line at San Francisco is practically 165 miles along the lines of pipe and canals. (The distance of the Crystal Springs dam is about 16 miles from the county line, the San Andres reservoir about 10 miles, and the Pilarcitos about 12 miles, and Lake Merced is within the city. The distance from the county line to the Sunol dam, and therefore the Alameda supply, is about 46 miles. p. 3409, Hering.)

The San Joaquin River is a navigable stream, and it is therefore necessary to submerge the pipe at the point of crossing. The water is carried under the river in three pipes, each of diameter of 36 inches, which are united into two again on the other side. The length of the pipe line across the San Joaquin valley will be approximately 60.5 miles. The length of the pipe line from the Altamont reservoir to the lower end of the second main tunnel will be 19.4 miles, and from the last-named tunnel to the receiving reservoir in San Francisco 50.7 miles. (p. 256, Grunsky.)

Mr. Grunsky has submitted his plans, surveys, and all of the detailed reports made by the various engineers under him, and these are set forth fully in the evidence. Consequently he was in no better position to know the values of the properties than were Mr. Hering, Mr. Schuyler, and Mr. Stearns, all of whom have had fully as much, if not more, experience than Mr. Grunsky in building large works or than Mr. Adams, who has had fully as much experience in the carrying on of

the engineering work of a city and more in the conduct of a water supply company, or than Mr. Schussler, who has had more experience than all of them (except possibly Mr. Hering and Mr. Stearns) in the actual construction of water supply systems.

Mr. Grunsky himself, in referring to the estimate of other properties, has laid down a proper rule for the valuation of such property. After giving in great detail the various items which must constitute a plant, and the various elements of danger, he said:

“These matters are referred to at this time because in considering the availability of any source of supply it is necessary to give due weight to all its features and to make allowance for those elements which are uncertain.” (p. 311, Grunsky.)

This theory is absolutely correct, but the other engineers find that, as a matter of practice, Mr. Grunsky eliminated practically all elements of uncertainty, by deciding apparently that because the property was a municipal system the usual factors of safety need not be inserted.

2. DIFFERENCES BETWEEN MR. GRUNSKY AND THE OTHER ENGINEERS.

These will be discussed under the following heads:

a: As to total effective quantity deliverable.

b: As to time required to build.

c: As to the relative physical advantages of Spring Valley and the Tuolumne project. Incidentally showing quality of Spring Valley water better than that deliverable by Tuolumne scheme.

d: As to cost of Tuolumne project.

a: AS TO THE TOTAL EFFECTIVE QUANTITY DELIVERABLE.

Mr. Grunsky gave it as 60,000,000 gallons per day (p. 320, Grunsky). Mr. Hering, on the contrary, gives it at 45,000,000 gallons per day, saying:

"The Belmont pumps are proportioned to handle but 30,000,000 gallons daily. The great length of the pipes of the pipe conduits, and particularly the open and unlined canal, together with the pumping of all the water by electricity transmitted a long distance, the comparative inaccessibility of the territory in winter, make a successful operation of that system difficult and expensive, and repairs will require more time than the nearer works, and it is probable the supply would not always be safe and constant because of such interruptions. It is difficult, under such circumstances, to say what the reliable capacity would be. Counting for interruptions, for intermittent pumping, my estimate is that it might be from one-quarter to one-half in excess of the present supply, or, let us say, in round numbers, 45,000,000 gallons. To have a reliable capacity of 60,000,000 gallons I should advise that an extra pipe or larger pipes be laid." (p. 3412, Hering.)

"Without the extra pipe, in my opinion, the scheme is not a reliable method for a supply of water for this municipality beyond the capacities I have stated, because of the possibilities, which I do not consider very remote, that there would be an interruption to the supply by washouts or accidents of some kind to the machinery or to the power transmission." (p. 3413, Hering.)

Mr. Schuyler considered that the two 48-inch pipes, with a 30,000,000 gallon maximum capacity each, could deliver only 50,000,000 gallons per day, saying:

"It, therefore, would be necessary to build two pipe lines in order to deliver 35,000,000 gallons, one of them delivering safely an average of 25,000,000 gal-

lons, while the other one would have an excess capacity upon the same hypothesis of about 15,000,000 gallons daily. But inasmuch as it would be unwise and unprofitable to build any smaller pipe, considering the rapid increase of demand and the future growth of the city, it would be necessary and essential to build two pipe lines of equal size for the delivery of the stated amount." (p. 5409, Schuyler.)

"In the supplying of San Francisco with water from the Tuolumne scheme, it would be a very unsafe proposition to construct and rely upon one pipe alone, assuming that it could deliver, as the City Engineer estimates, 30,000,000 gallons per day. The one pipe line would certainly be subject to interruptions such as I have heretofore described, due to accidents to ditches, or the power plants, or the transmission lines, or the pumps, which would necessarily produce an interruption of the service and might place the city of San Francisco in a perilous position for lack of adequate fire protection at some critical period." (pp. 5408-9, Schuyler.)

b: AS TO THE TIME REQUIRED TO BUILD.

It will thus be observed that, if San Francisco is to depend upon the Tuolumne scheme entirely, the question of estimated minimum supply of water therefrom becomes very material. As a matter of fact the average consumption of San Francisco in the year 1903-4 was 32,000,000 gallons per day, and it occasionally ran up to 42,000,000 gallons per day (Hering, p. 3861), and on one particular day it ran as high as 44,559,000 gallons (Schuyler, p. 5403). Consequently, unless the "Tuolumne system had some factor of safety not provided for, it would be necessary for a third pipe line to be installed immediately after the completion of the first two pipes. Mr. Schussler estimates that in 1910 the consumption will be 40,000,000 gallons per

day, and in 1920, 55,000,000 per day. This would make an average of 45,000,000 gallons per day somewhere between 1913 and 1914. It would take five years to construct the two-pipe system according to Grunsky (p. 386) and eight years according to Adams (p. 4674). At the time of their completion they would be immediately taxed to their full capacity. As it would be absurd to delay for this short time the laying of the third pipe line and thus necessitate the additional expense of reassembling the administrative force, the repairs of roads and the like, the conclusion must be that the three pipes should be laid at the same time. This is especially so as all the engineers who have had charge of water works in cities which have passed the 40,000,000 gallons per day stage, agree that the per capita consumption of water increases as the population grows, due to many causes.

Mr. Schuyler testified as to length of time to build:

"It is a somewhat difficult matter in a work of such magnitude to figure closely on the many contingencies which always arise to retard a great undertaking, but in my estimate of the probable cost of a substitutional system, based on the general scheme proposed by Mr. Grunsky of bringing water from the Tuolumne, I have assumed that the entire work might be done in about seven years. * * * In all probability it would take three to four years to build the third pipe line, with all its connections and with the additions required to the power house plants, the transmission lines, the pumps at Altamont and also at Belmont." (p. 5398, Schuyler.)

Mr. Stearns does not figure on the length of time that it would take to build, but follows Mr. Grunsky's fig-

ures. He estimates that the consumption of San Francisco in 1910 would be 45,000,000 gallons per day (p. 4224), and that a third pipe line would be necessary as soon as the works were completed, if they were begun in 1905 (p. 4225).

Mr. Adams gives the effective average capacity of each of these pipes at 27,000,000 gallons daily (p. 4685, Adams), making the total for both pipes 54,000,000 gallons.

Mr. Stearns estimates the gross capacity of both pipes at 45,000,000 gallons daily, saying:

"The conclusion that I have reached is that the system, even if the Belmont pumping station is kept, so that it can be operated at all times, cannot supply safely more than 45,000,000 gallons daily as an average throughout the year. This would leave a capacity in the two pipe lines taken together of 15,000,000 gallons per day in excess of the average requirements for the whole year; at least 5,000,000 gallons of this amount would be required in the summer and autumn to meet the extra consumption in the warm and dry weather. The remaining capacity is none too large to leave as a factor of safety with which to fill the Belmont and other reservoirs after they have been drawn down when the system has been out of service for the purpose of making repairs, or on account of the turbidity of the water. The system through which the water would be conducted is so very long, and it has so many features which may get out of order or require repairs, that it seems likely there would be a considerable percentage of time when the works would be out of service, and after the interruption of service the Belmont and other reservoirs should be filled without too much delay. There is still another reason why the pipes should not be used to nearly their full capacity, namely, that it has been found by experience that it is very difficult to predict accurately for even a few years in advance

what the consumption of water will be, and at times it increases very rapidly. An additional supply from such a distant source would require several years—probably from four to five—for making an addition to the supply, and, under such circumstances, it would not be safe to approach too near the full capacity of this system, as otherwise there would be danger of a shortage of water from an unexpectedly large increase in the consumption of water.” (pp. 4218-19, Stearns.)

Mr. Adams testified (p. 4674) :

“I do not think that it would be at all safe to count upon the works being completed in a less period than eight years from the time of commencing construction. There are, of course, instances when very large sums of money have been successfully expended on engineering structures in a much shorter space of time, but, on the contrary, there are numerous cases in water works construction where the creation of works involving an expenditure amounting to but a fractional part of that contemplated here, has required a proportionately much longer time. It is impossible to forecast with exactness in advance how long a time would be required for the creation of works of such magnitude, but I should not want in the preparation of estimates, to assume a less length of time than eight years.”

c: AS TO RELATIVE PHYSICAL ADVANTAGES OF SPRING VALLEY AND TUOLUMNE. INCIDENTALLY SHOWING THAT QUALITY OF SPRING VALLEY WATER BETTER THAN THAT DELIVERABLE BY TUOLUMNE SCHEME.

Mr. Grunsky gives the relative values as follows :

“The Spring Valley Water Works system, to the extent of its capacity, ranks first in the reliability of service. The Tuolumne River project ranks highest in the quality and quantity of water. In the matter of first cost to the city the advantage should be in favor of the Spring Valley system (p. 316, Grunsky.)

"It seems unnecessary to extend the making of plans to projects for the utilization of other sources than those already examined, so long as no facts are known which would justify the hope that they can be shown to be more available than the Tuolumne River which, in the light of information now at hand is the most available source of supply for an independent system of municipal water works, or for the re-enforcement of the established system." (p. 316, Grunsky.)

"The main item of cost for all Sierra Nevada projects is that of pipe construction. The best quality of laminated iron has been assumed the requisite and has entered into the calculations at 3.25 cents per pound, San Francisco delivery." (p. 416, Grunsky.)

Mr. Adams testified:

"Applying the principles of a substitutional plant, on the question of valuation, I consider the works of the Spring Valley Water Company of superior value to any works which can be created within practical limits of cost, with the Tuolumne River, supplemented by Lake Eleanor and Hetch Hetchy reservoirs, as a source of water supply." (p. 4723, Adams.)

"I have not extended my studies of the Tuolumne project to the extent of determining what its safe ultimate yielding capacity might be. I have assumed that the sources of supply are sufficient, as claimed by Mr. Grunsky, for the amount of more than 60,000,000 gallons a day. As to the relative qualities of the water to be derived from such a source, as compared with that supplied by the Spring Valley Water Company, my opinion is that if the Tuolumne project is built in accordance with the plans proposed, that the *water delivered to the consumer in San Francisco will not be in quality superior to that supplied at the present time by the Spring Valley Water Company.*" (p. 4724, Adams.)

Mr. Schuyler testified:

"I have computed the capacity of the main conduits delivering water to the city and find it to be as follows:

	Gallons daily.
Pilarcitos pipe line.....	14,400,000
San Andres pipe line.....	12,760,000
Crystal Springs pipe line with full reservoir.	25,100,000
Crystal Springs pipe line, reservoir two-thirds full	19,960,000
Alameda pipe line, from Sunol dam.....	16,500,000
Alameda pipe line, from Niles dam.....	12,600,000

The only one of these conduits which is operated to the limit of its capacity is the Alameda pipe line bringing water across the bay; the others have an excess capacity available for emergencies, amounting to nearly 20,000,000 gallons per day. * * * This is about 5,000,000 gallons in excess of the surplus carrying capacity of the Tuolumne scheme proposed by Mr. Grunsky, according to my estimate of the efficient carrying capacity of the two pipe lines." (p. 5412, Schuyler.)

"I consider that the Spring Valley plant now in use is far superior from every point of view, in safety, reliability, cost of maintenance and all other considerations, to the proposed substitute plant deriving its supply from the Tuolumne River." (p. 5445, Schuyler.)

"I have no doubt that the Tuolumne River, as a source of supply, is capable of yielding safely a daily supply of more than 60,000,000 gallons, although I am not prepared to say how much would be permitted to be taken from that source without interference with the prior claims and rights of the irrigators in the two extensive irrigation districts in the San Joaquin valley, which depend upon this source alone for their supply. The Spring Valley sources can be developed to supply over 100,000,000 gallons. To compare the two sources on this basis of quantity available one should know the extent of the prior rights on the Tuolumne River, which I have not investigated. *As to quality, I feel confident*

that the Tuolumne supply will be inferior to that of the Spring Valley Company if carried as contemplated, nearly 30 miles in open ditches, after having been confined in a reservoir, exposed to the summer sun." (p. 5447, Schuyler.)

"When I speak of the supply I speak of the natural sources rather than the methods and means of diversion which Mr. Grunsky adopts in estimating the quantity as larger than 60,000,000 gallons per day." (p. 5447, Schuyler.)

Mr. Hering testified that he had read Mr. Grunsky's report as to the relative value of far and nearby supplies and made extracts therefrom, as follows:

" 'It follows, therefore, that remoteness of a supply is a disadvantage, and that between any two practically equally distant sources the one is to be preferred which can be made available by the most reliable and the most permanent works.

" 'In this connection, there is also to be considered the fact that in one case works may be of a character whose reliability has been established by experience and practice and concerning the construction of which and the character of service, quality and quantity of water, no reasonable doubts can be entertained. Such works are to be preferred to works not yet constructed and particularly to works which involve departure from ordinary practice and whose execution and maintenance is at more than ordinary risk.

" 'Many other things may be brought into the comparison, as, for instance, the facility for the gradual increase of the capacity of conduits or other appliances required for the delivery of the water in order that the delivery may keep pace with the growth and growing needs of the municipality. A system that must at once be constructed of a capacity to meet the probable requirements fifty or more years in the future may prove relatively expensive, and this may be rated as a disadvantage when compared with one which permits an installation which, though adapted to immediate re-

quirements, is still capable of expansion as occasion arises.' " (Hering, p. 3965.)

And again:

"I have made a rough estimate of cost as to what the Tuolumne project would have cost the city when the daily consumption shall have attained the figures of 75,000,000 gallons, provided that a third pipe is laid, which would be necessary. I have also made an estimate of cost for additional structures which would be required to furnish 75,000,000 gallons daily, namely, 30,000,000 gallons from Calaveras and 10,000,000 gallons from San Antonio, daily. These figures refer to the extension of the Spring Valley works. These estimates are but rough approximations. The Tuolumne project would cost, I think, not less than \$80,000,000; whereas the additional works for the Spring Valley Company would probably not exceed a cost of \$15,000,000, which, added to my valuation of the present works, would amount to a total of \$60,000,000." (Hering, p. 3967.)*

*The more accurate details given by Mr. Hering are as follows:

"To furnish 75,000,000 gallons daily from the Tuolumne:	
Mr. Grunsky's figures, for this supply, including city distribution	\$39,531,000
Add additional expense for two wrought-iron pipe lines..	12,694,000
Add net cost of two iron pipe lines between Dry Creek and Cherry Creek	5,386,000
	<hr/>
	\$57,611,000
No addition for Hetch Hetchy and Eleanor reservoir property, and water rights therefrom.	
No addition for cleaning bottom of reservoirs.	
No addition for interest during construction.	
An under-estimate for land values for Belmont reservoir, rights of way, litigation and road construction.	
Add for a third pipe line to Cherry Creek.....	22,693,000
	<hr/>
	\$80,304,000
Or, in round figures, \$80,000,000.	

Mr. Stearns testified in reply to the question: "Compare the value of the complainant's property in full use with the Tuolumne scheme as contemplated by Mr. Grunsky, if now complete?" as follows:

"It seems to me impractical to make a fair comparison which eliminates all consideration of future developments and use. If this limitation is made, however, and I am confined to comparative value of these two systems of works for supplying water to San Francisco at the present time, I should consider the Spring Valley works the more valuable as they are the more certain to furnish an uninterrupted supply to the city at the present time." (p. 4276, Stearns.)

"I consider the works of this company to be decidedly above the reasonable and proper standard in point of skill and enterprise in their location, selection, design and construction." (p. 4277, Stearns.)

"I gave that matter careful consideration and concluded that I would allow for that especial skill (referring to that of Mr. Schussler in constructing complainant's plant) that has been shown a sum that would

Footnote, continued.

"To furnish 75,000,000 gallons a day from the Spring Valley Water Company's supplies:

The present supply being 35,000,000 gallons, there are re-

quired 40,000,000 gallons daily in addition. Of this,

30,000,000 gallons are estimated to be supplied from

Calaveras and 10,000,000 gallons from San Antonio.

One 54-inch pipe line from Calaveras to city.....\$ 7,567,000

Calaveras reservoir 3,500,000

\$11,067,000

One 36-inch pipe from Niles screen-tank to city, including

pumps 2,712,000

San Antonio reservoir 970,000

Total\$14,749,000

Or, in round figures\$15,000,000

Present valuation 45,000,000

Total\$60,000,000"

(pp. 3967-8, Hering.)

be sufficient to offset the deterioration of the plant and to add 10 per cent to its value as otherwise obtained." (p. 4277, Stearns.)

The comparative physical advantages of each supply are shown by the disadvantages of the other. The only advantage claimed for the Tuolumne system is that by Mr. Grunsky that the quality of the Tuolumne supply would be the better (p. 316, Grunsky.) This fact, however, is disputed by all of complainant's engineers.

Mr. Stearns testified:

"I believe that the water to be obtained from the Tuolumne scheme as proposed by him will not be of as good quality as that furnished by the Spring Valley Water Company, except, I might say, that it will be a softer water. The quantity of water that would be furnished by his scheme would be somewhat larger than the Spring Valley Water Company can furnish at the present time, but the works of the company are capable of extension so as to furnish the additional water required at a much lower cost than from the Tuolumne River." (p. 4238, Stearns.)

With reference to the quality as affected by the open canal, Mr. Stearns testified:

"In an unlined open canal on a steep hillside, as in this case, water would deteriorate in quality both by its exposure to the sun in the shallow canal and by opportunity afforded for the pollution of the water; some would be lost by filtration and such a canal would be more liable to accidents and interruption than a tunnel. It would seem to me advisable, in view of the very great length and cost of the work, that this portion should be built wholly in tunnel, fully lined, so that the works would be less liable to interruption and to the liability to pollution and deterioration of the water, which I have spoken of." (p. 4233, Stearns.)

Again Mr. Stearns testified:

"From an hygienic point of view, the water supply of San Francisco is, so far as I know, one of the best, if not the best, water supplies of any large city in the United States." (pp. 4255-6, Stearns.)

Mr. Schuyler testified:

"I regard the quality of water that is supplied by the Spring Valley Water Company as exceptionally pure and good compared with the water supply of any other city of equal or greater size in this country, and equal or superior to the supply of any other city or town in this State." (p. 5405, Schuyler.)

"Assuming the structures and the methods of conveyance provided by Mr. Grunsky for the Tuolumne water, that is to say, from that source and its adjuncts, I do not believe that the water would maintain its purity after it left the headworks, unless the scheme as outlined by him were to be materially changed and the water carried throughout in closed conduits. The proposition of carrying the water for 27 or 28 miles in open ditches along the mountain sides is one which must necessarily lead to constant pollution of the supply not only from matter picked up from the bed and banks of the canal as it passes along, but it would be exposed to the action of the sun throughout that distance and subjected to the pollution from the drainage of the pastures through which it passed, and subject to pollution from the wash of the mountain sides in storms, and also from land-slides from the mountains; the blowing of dust and leaves and other trash borne by the winds and deposited in the canal would further add to the pollution of the water." (p. 5405, Schuyler.)

On cross-examination he testified:

"The planning of works like that is quite as much dependent upon a judgment in the general design as in the examination of the ground itself. My objection

to the general design is that it has very many weak features and is liable to a great number of accidents and interruptions and vicissitudes which would render it a system less desirable than one from a source nearby, such as the Spring Valley system, which is not dependent upon so many of the weaker elements that are embodied in this system; for instance, the system, in the first place, depends upon the continuous and perfect operation of two electric plants which generate electricity and transmit power across the San Joaquin valley for the pumping of the entire supply up to the summit of the Coast range, a height of something like 600 feet, plus the section; we all know that electrical plants are subject to constant interruptions, any one of which would be liable to cause an interruption in the supply to these pipes. If the water fails to flow continuously in the pipes for any length of time the pipe must be refilled; it becomes empty, of course, and must be refilled. A long line of pipe of that sort presents many dangers in the process of refilling; moreover, it has less capacity, on the average, because of such interruptions, and it is not discharging when those interruptions are taking place. If the pipe line were a continuous grade-line pipe all the way from the Tuolumne system to San Francisco, without excessive pressure and without the necessity of those breaks, by which it is required to be lifted up to a considerable height before it can proceed, it would be a very much preferable system. Again, the great length of the pipes multiplies the possibility of interruption and breaks." (p. 5498, Schuyler.)

"Electrical plants are more liable to interruption than steam plants." (p. 5499, Schuyler.)

"I know that the plants of the Bay Counties Power Company, now known as the California Gas and Electric Company, are very frequently interrupted and stopped by breakages in their flume, in the breaking of their pressure pipes, in the burning out of transformers and in accidents to the transmission line. All such interruptions as those are very conspicuously illustrated by the history of that very plant you have cited. If this

plant were subjected to the interruptions that have occurred in the operation of the Bay Counties plant this city would be out of water, if it were dependent upon that system, a very considerable part of the time. That is one of my objections to this system." (p. 5499, Schuyler.)

Mr. Adams testified:

"Compared with the quality of water usually supplied cities I regard the quality of water that is supplied to San Francisco by the Spring Valley Water Company as very good." (p. 4680, Adams.)

"Assuming the structures and methods of conveyance provided for by Mr. Grunsky for the Tuolumne water, that is, provided from that source and its adjuncts, I am certain that that water would not maintain its purity after it left the headworks. The conducting of the water down the bed of the stream from the storage reservoirs to the point of diversion, and thence through many miles of open canal and through several open reservoirs would undoubtedly have a marked effect upon the original quality of the water. In my judgment it would not be superior to, and possibly not so wholesome as the water now supplied by the Spring Valley Water Company. I would regard it as absolutely essential in the construction of this enterprise that, for the long line of open ditch, a suitably covered structure be substituted in order that dust and dirt carried by the winds and that the wash from the mountain slopes above the ditch might be properly 'excluded.'" (p. 4680, Adams.)

Mr. Hering, when asked his opinion on the subject of quantity and quality between the Tuolumne scheme and the Spring Valley Water Works, testified:

"I am satisfied that your properties can be developed to yield as much, if not more, water than could be obtained from the Tuolumne water shed as proposed. Regarding the quality of the water I am satisfied that the present Alameda supply is better in quality than

the water which would be brought here from the Tuolumne, after running through so long an open ditch as proposed, and that the water from the peninsula system would probably be equally as good." (p. 3480, Hering.)

As to the efficacy of the natural filter beds of complainant at Sunol, in producing pure water, Mr. Hering testified:

"Q. 248. Do they accomplish the purpose of ordinarily used filter-beds, in your judgment, in treating the water?

"The water is as clear to the eye as any water that I have seen coming from an artificially constructed filter-bed and, according to analysis, the water is quite healthful and has no materials in it or bacteria, such as we try to keep out, any more than there would be in artificially filtered water. On the whole, I think the results are equally good to those that would have been obtained from artificially constructed beds." (p. 3454, Hering.)

Again he testified as to the relative quality of water from complainant's supply and the Tuolumne scheme:

"I do not consider that the Tuolumne supply would furnish a greater quantity of water, nor a water of better quality, than can be obtained from nearer sources. * * * The proposition to carry the water from long distances through an open earth canal has the disadvantage, irrespective of washouts, that leakage will cause the permanent loss of some of the water, and the warmth of the sun would cause growths in the water. * * * Regarding the quality of the water, it is mostly melted snow and ice. The water should, therefore, be very soft, clear and palatable, particularly as the prevailing character of the rock is granite. I do not, however, share the opinion that, after this water has been standing for months in the Sierra reservoirs, and has run for long distances in an open ditch, its quality will remain superior to the waters which are now gathered

from your water sheds into your reservoirs. *In my opinion, it would not even be as good.* (p. 3464, Hering.)

Mr. Grunsky testified, concerning the quality of water furnished by complainant:

"The wholesomeness of the water delivered has been established by long continued use." (p. 221, Grunsky.)

Again:

"Fortunately their actual use for half a century is a strong argument in their favor and their quality as determined when stored in large reservoirs and brought long distances in pipes under pressure is a much better guide than any examination of the living stream before its water is given an opportunity of becoming clear and freed from original impurities." (p. 222, Grunsky.)

"The quality of the water for the supply of this city should be of the highest attainable degree of purity. Such water is obtainable from the high uninhabited Sierra Nevada mountain regions. It is also obtainable from other streams and by storage, *ultimate filtration* to be regarded essential in case there is any considerable amount of human life and activity in the tributary watershed areas." (p. 224, Grunsky.)

Filtration costs \$2.50 to \$3.00 per million gallons. (Hering, p. 3538.)

d: AS TO COST OF TUOLUMNE PROJECT.

Mr. Hering testified:

"To ascertain the cost of the Tuolumne supply fairly it is necessary to assume equal supplies, which, in the preliminary studies, have been taken at 30,000,000 and 60,000,000 gallons per day. In order to make the Tuolumne supply reliable, it is necessary to estimate for it a reserve or safety pipe and other structures to the same extent that you have provided similar safe-guards in your own works. It is therefore proper that one of two expedients be carried out; either a large storage reservoir should be provided between the San Joaquin

valley and the city, for use in case of a disaster to the long single supply-line from the Sierras to that valley, or, two pipe lines should be built at once for the entire distance. It is further necessary to assume the same standard of materials and workmanship, so as to secure equal efficiency and durability. Wherever possible, equal conditions should maintain in all parts of the work. I made some rough estimates and have kept the tendency rather to under- than to over-estimate the cost of this work. For instance, the open ditches have been preserved where closed channels would be decidedly preferable and would have to be built, in my opinion, eventually. I have raised the price for the pipes materially over Mr. Grunsky's figures, and have based that on the experience, as to actual cost, which was gained in constructing your own work." (p. 3466, Hering.)

"In case one of the Tuolumne pipe lines should meet with some accident so that it could not be operated for a short or for a long period, the city would be deprived of the necessary full water supply, unless there was sufficient storage on the city side of the interruption to last long enough to repair any damage." (p. 3467, Hering.)

"Assuming that no storage reservoir exists or is provided for between Altamont and the distributive system, and that only pipes are located between Altamont and that distributive system, then, if one of those pipes should meet with an accident and be temporarily destroyed or rendered non-usable, the city would be deprived of the necessary full water supply." (p. 3467, Hering.)

"To overcome these objections and hindrances to a full daily supply, either another pipe line, or larger pipes than those that have been proposed, would be essential, or to provide the necessary storage capacity." (p. 3468, Hering.)

Mr. Hering then estimated the value of Tuolumne as the next most feasible alternative project to supply this city with water of "equally good quality and

equally good quantity," at \$55,000,000. (p. 3475, Hering.)

In this, however, he did not take into account anything except the physical question of construction of a water plant from the proposed Tuolumne reservoirs to this city, saying:

"I did not know of any such difficulties (referring to legal and political difficulties), and assumed that the report issued by the city, with the apparent result that the Tuolumne source was the best water supply for this city, was correct." (p. 3623, Hering.)

Again, in cross-examination, he said:

"I estimate the cost of the Tuolumne system very much more than \$45,000,000, very much more; I do not think that \$10,000,000 would cover the difference." (p. 3678, Hering.)

"I think the Tuolumne scheme would cost \$55,000,000 at least." (p. 3678, Hering.)

"I have read Mr. Grunsky's reports, and know the care with which Mr. Grunsky makes his investigations, and I have seen his conclusions and his figures and also most, if not all, of his plans, and, taking the matter altogether I thought I had sufficient knowledge of the subject to be able to endorse him in certain matters and not to agree with him in others." (p. 3679, Hering.)

Again, in cross-examination, he said:

"I think that he (Mr. Grunsky) under-estimated the cost of wrought-iron pipe." (p. 3794, Hering.)

"I had the data of the actual cost of the work of the Spring Valley Water Company's wrought-iron pipes.

* * * The estimate is made up of the cost of the iron, of the cost of making the pipe, the cost of taking the pipe to the location where it is to be laid, and then the laying of the pipe." (p. 3794, Hering.)

"The dipping of the pipe is included in the making. Concerning the dipping I had my past experience before

me, of course, and that indicated to me that none of the items that Mr. Schussler gave me were in any way unreasonable or out of the way." (p. 3795, Hering.)

Again, he testified:

"A very important item to consider is how the pipe is manufactured and where it is laid; for instance, the soil may make a great difference on the life of the pipe. As I have already stated, any current of electricity which, for one reason or another, passes through this pipe may ruin a pipe in a very few years; it has even ruined cast-iron pipe. Alkali soil, for instance, is known to be very destructive on the same pipe. The engineer must consider a good many things." (p. 3800, Hering.)

"If the wrought-iron is made according to Mr. Schussler's specifications, or to specifications such as I have seen in England, I should personally believe that wrought-iron would outlast steel or cast-iron, under the same conditions, in New York, in California, anywhere." (Hering, pp. 3800-01.)

As to the relative capacity of Mr. Grunsky and Mr. Hering to pass upon the Tuolumne project, Mr. Hering testified, on cross-examination:

"Q. In view of the fact that Mr. Grunsky went over the entire proposed route himself with gangs of men under his supervision, in view of the fact that he examined the nature of the soil from the point of the proposed intake clear to the city of San Francisco, in view of the fact that he worked out down to these minute details the entire length of this conduit, would you say that your judgment, based merely upon an examination of the plans and specifications, was better than his who had worked this matter all out?

"A. I would not make any comparison of that sort. I would say that my own judgment was the best I could give. I want to say a further thing, that from the very fact I had not examined the location and had not examined some other things that I should have liked

to examine, whatever they may have been, I constantly said to myself, I will add nothing more to the estimate of Mr. Grunsky's cost but this item for an additional cost of the pipe; should that be greater than it really would turn out to be, then the difference is covered fully, in my opinion, by the other matters which Mr. Grunsky did not estimate on at all and for which I also made no estimate whatever." (pp. 3803-4, Hering.)

"Q. Is there anything besides coincidence in the fact that your testimony concerning the proposed Tuolumne scheme, in getting at a final estimate of it, differs from Mr. Grunsky's only in the same particular that Mr. Schussler's does?

"A. I think I have already stated and will state again that I took Mr. Grunsky's figure after I had made the studies which I said I made. Then I was aware of a number of points which I believe would increase the cost of the work materially. In order to get figures I should have to go into details and figure them out. As I did not think it was necessary I took Mr. Schussler's figure, I have stated, because it substantially agreed with my own; but I also believe, as I have stated, that there are a number of features of this project that would come in for payment if the work was executed; in case this figure of Mr. Schussler on the pipe line were excessive it would pay for those other deficiencies in the estimate of cost. That view I still hold." (p. 3812, Hering.)

And on re-direct examination Mr. Hering testified that the reasons for the difference between the opinions of himself and Mr. Grunsky were as follows:

"First, I think he has under-estimated the future population of San Francisco; I also consider that he has under-estimated the cost of wrought-iron pipe, such as I would approve of laying, and such as he recommends; thirdly, he has not made any allowance for the interest on the money required for construction and before rates could be collected; fourth, the open channel which he recommends to be built between Dry Creek and Cherry

Creek, I could not approve of for furnishing the excellent water which is desired. In my opinion, the water flowing in so long an open channel, generally on a side hill, and about 27 miles long, exposed to pollution from animals as well as leaves and vegetable refuse and also to surface washings, would very materially lower the quality of the water; fifth, I do not believe, in view of the experience we have had in the East, that the water stored in the Hetch Hetchy valley, upon the present large accumulation of organic matter, would remain in good condition; the Hetch Hetchy valley, as well as others in similar localities, would be very warm during the summer months and the water would partake of this temperature, and there would be a decomposition of the accumulated organic matter in this water so that it would not be preserved in its present pure condition. In the East we are, in almost all cases, endeavoring to remove all such large accumulations of organic matter from reservoir sites. If it were too expensive to excavate all of this organic matter, an alternative expedient would be the filling in of clean sand or gravel to a proper depth and thus form a new and clean reservoir bottom." (pp. 3960-1, Hering.)

"I have noted the fact that in Mr. Grunsky's report and in his estimates, he makes the following figures: 'Lands and litigation, water rights and rights of way, outside of San Francisco, \$918,000.' From my experience and investigations and observations in this vicinage, I think that estimate is much too low. In the first place, the Belmont reservoir site, which I have seen, it seems to me could not be procured for a sum less than \$1000 an acre on the average. I further believe that at least two-thirds of the entire pipe line would have to be laid upon purchased rights of way. Mr. Grunsky evidently cannot allow anything for the water rights and reservoir property of the Hetch Hetchy valley and Eleanor Lakes. Whether or not these could be obtained free of expense I do not know."

"Q. Assuming that they would be obtained free of expense, does that make their value nothing?

"A. It would reduce their cost. Therefore, taking all these items into consideration, I believe that the item of \$918,000 is much under-estimated. I also think the cost of road construction is under-estimated. No estimate has been made for excavating the mud, or filling it over with clean material, in the Hetch Hetchy valley or Lake Eleanor; nor has any estimate been made by him for laying the wrought-iron pipe between Dry Creek and Cherry Creek, which would cost, at least, \$5,000,000 more than the expense which he has estimated for the canals." (pp. 3961-2, Hering.)

"In my estimate of the least possible cost of the Tuolumne project, I added to Mr. Grunsky's estimate, only two sums, namely, \$12,694,000, obtained from what I believe is the difference of cost of making and laying the wrought-iron pipe between the city and Dry Creek, as estimated by Mr. Schussler; I also added a sum representing interest during construction—I think that was \$3,800,000." (p. 3962, Hering.)

"The \$12,694,000 did not relate to any third pipe, but merely to the cost of the material, manufacture, delivery and laying complete of the two wrought-iron pipes recommended by Mr. Grunsky." (p. 3963, Hering.)

As already shown, Mr. Hering estimates that the relative values of Spring Valley and the proposed Tuolumne system when the daily consumption of San Francisco shall have reached 75,000,000 gallons, will be respectively \$60,000,000 and \$80,000,000. (pp. 3967-8, Hering.)

Mr. Stearns testified in this regard:

"I think I have investigated the water situation around San Francisco enough to know that the Spring Valley plant and its properties, as I understand them, are more valuable than any other, including the Tuolumne scheme." (p. 4466, Stearns.)

Again, when asked to give the detail of the difference between his figures and Mr. Grunsky's, he testified:

"I should not recommend the unlined open channel which he has suggested, but instead would provide a fully lined tunnel; also that I should provide the fully lined tunnel in place of the side tunnel which he has recommended. Making these changes would increase the cost of the works, on the basis of his estimates, \$4,300,000. I believe that the Belmont reservoir should be prepared with a view to its frequent use, and since it is a reservoir in which the water will not be changed very frequently, and from which the water will be taken and sent very directly to San Francisco, going only through the smaller distributing reservoirs, the soil should be stripped from the Belmont reservoir. Provision should also be made for diverting the local drainage which comes into it, unless all the water shed lands are purchased. The dam of the Belmont reservoir is, in my opinion, not sufficiently strong for a dam at this place, located above the populated district there, and I should make an addition to the cost of the works for thickening the dam. In addition, as I have already stated, my estimates of the consumption of water indicate that it would be necessary to lay three 48-inch pipes instead of two in the beginning, and to enlarge the pumping and power stations to a corresponding extent. I can give but a rough estimate of the cost of the changes which I would suggest at the Belmont reservoir, but they amount to about \$580,000. The cost of the additional pipe, pumping and power stations, on the basis of Mr. Grunsky's estimates, would be \$11,600,000. The sum of these suggested changes would increase the total from \$39,531,000 to \$56,011,000, exclusive of interest during construction. This interest should be added, and, reckoning the interest at $3\frac{1}{2}$ per cent, and basing it on the proportionate amount of work to be done in different years, as estimated by Mr. Grunsky it will amount to \$4,459,000, making the total cost of changes, and including interest during construction, \$60,470,000. This does not in-

clude a thing which I think should be done, namely, the extension of the works from the junction of the Tuolumne River and Cherry Creek. The advantage of that extension would be that if the water from one stream was turbid, or otherwise of poor quality, then the other, the best water, could be taken." (p. 4234, Stearns.)

"I have used Mr. Grunsky's figures throughout, except for the estimates of additions to the cost of the Belmont reservoir, where I have used figures which I think would correspond fairly well with his." (p. 4236, Stearns.)

"It is my opinion that the Tuolumne scheme as proposed by Mr. Grunsky will not have sufficient capacity for the purpose of furnishing San Francisco and its inhabitants with water on the completion of the works." (p. 4236, Stearns.)

"The (Tuolumne) system takes water directly from the river, except for the pond made by a small diverting dam where the water is liable to be turbid at times, and in general the supply would be much less satisfactory than if taken directly from the reservoir. The very great length of the works required to bring the water to San Francisco, amounting to 182 miles, would in any case give many opportunities for accidents which would result in the interruption of the supply, but such interruption would be much more likely to occur in a system which contained such novel features as the production, in large amounts, of high-tension currents of electricity, their transmission for more than 60 miles and the application of electricity to pumping large quantities of water where there would be the very unusual lift of about 600 feet. When the operation of the works is interrupted from any cause, there must obviously be considerable delay in getting them in full operation again. There also seems to be a grave danger that the pipes of such a system might be affected by electrolytic action. The electricity transmitted for pumping and for other power which may be transmitted from the mountain streams to San Francisco has to find its way back to

the generators, and would naturally follow long lines of pipes, which would furnish such excellent conductors, and it might result in their destruction in a comparatively short time. Taking the proposed system as a whole, there are so many uncertainties that I should not regard it as a safe and first-class system of water supply." (pp. 4236-7, Stearns.)

Again Mr. Stearns testified:

"The third pipe would be necessary as soon as the works could be completed, if they were begun now, that is, in 1910." (p. 4225, Stearns.)

"The third pipe line ought to be commenced and constructed along with the other two." (p. 4225, Stearns.)

"I am able, from Mr. Grunsky's figures, to estimate what he considers each pipe line and all the appurtenances which are necessary to be constructed and used in connection with it, would cost." (p. 4225, Stearns.)

"That estimate is substantially \$11,650,000." (p. 4226, Stearns.)

"It is my opinion that, in order to render the Tuolumne scheme a safe supply by the time it is completed in 1910, \$11,650,000 should be added to the estimate which Mr. Grunsky has made of its cost." (p. 4226, Stearns.)

"The total would then be, on Mr. Grunsky's estimate, with the third pipe line, \$51,181,000." (p. 4226, Stearns.)

"The total cost of the Tuolumne scheme, including the third pipe, if interest is allowed during the construction at the rate of 3½ per cent., would be \$55,300,000." (p. 4227, Stearns.)

"A fourth pipe would be needed in the Tuolumne scheme in 1920, to take care of the increased consumption, a fifth one in 1930; that is, allowing five years for construction, it would be necessary to begin building these pipes in 1915 and 1925 respectively. I have not carried the estimates further than 1930, but the interval between the laying of pipes, assuming, of course,

they are to be laid of the same size, would probably be shorter after 1930 than before." (p. 4227, Stearns.)*

*"I have made a tabulated statement showing the annual cost of water supply from the Tuolumne River, and its incidents, for a series of years, say from 1910 forward, assuming that the works are completed in 1910." (p. 4227, Stearns.)

SCHEDULE OF BONDS TO BE ISSUED FOR CONSTRUCTING TUOLUMNE WATER WORKS,

Reckoning, however, all bonds issued prior to 1910 as of that date and allowing simple interest on such bonds at the rate of 3½ per cent per annum. This schedule is based upon Mr. Grunsky's designs and estimates of cost and upon Mr. Stearns' estimates of future water consumption.

Year.	Bonds issued in the year.	Total issue to date.	Sinking Fund equal 1/40 of total issue.
1910.....	\$55,300,000	\$55,300,000	\$1,382,000
1911.....	.....	55,300,000	1,382,000
1912.....	.....	55,300,000	1,382,000
1913.....	.....	55,300,000	1,382,000
1914.....	.....	55,300,000	1,382,000
1915.....	.....	55,300,000	1,382,000
1916.....	600,000	55,900,000	1,398,000
1917.....	2,000,000	57,900,000	1,448,000
1918.....	3,000,000	60,900,000	1,522,000
1919.....	3,000,000	63,900,000	1,598,000
1920.....	3,000,000	66,900,000	1,672,000
1921.....	.....	66,900,000	1,672,000
1922.....	.....	66,900,000	1,672,000
1923.....	.....	66,900,000	1,672,000
1924.....	.....	66,900,000	1,672,000
1925.....	.....	66,900,000	1,672,000
1926.....	600,000	67,500,000	1,688,000
1927.....	2,000,000	69,500,000	1,738,000
1928.....	3,000,000	72,500,000	1,812,000
1929.....	3,000,000	75,500,000	1,888,000
1930.....	4,000,000	79,500,000	1,988,000

TABLE SHOWING ANNUAL COST OF WATER SUPPLY FROM
THE TUOLUMNE RIVER FOR A SERIES OF YEARS,

Based upon Mr. Grunsky's designs and estimates of cost of works and upon Mr. Stearns' estimate of future water consumption and of the safe working capacity of the pipe lines.

Year.	Outstanding Bonds.	Sinking Fund.	Interest on Bonds at 3½ per cent.	Operating Expenses	Taxes Outside of San Francisco.	Total Annual Cost.
1910....	\$55,300,000	\$1,382,000	\$1,935,000	\$676,000	\$313,000	\$4,306,000
1911....	53,918,000	1,382,000	1,887,000	691,000	313,000	4,273,000
1912....	52,536,000	1,382,000	1,839,000	706,000	313,000	4,240,000
1913....	51,154,000	1,382,000	1,790,000	719,000	313,000	4,204,000
1914....	49,772,000	1,382,000	1,742,000	730,000	313,000	4,167,000
1915....	48,390,000	1,382,000	1,694,000	744,000	313,000	4,133,000
1916....	47,008,000	1,398,000	1,666,000	753,000	318,000	4,135,000
1917....	48,210,000	1,448,000	1,687,000	763,000	333,000	4,231,000
1918....	49,768,000	1,522,000	1,742,000	773,000	355,000	4,392,000
1919....	51,240,000	1,598,000	1,793,000	783,000	376,000	4,550,000
1920....	52,642,000	1,672,000	1,842,000	793,000	399,000	4,706,000
1921....	50,970,000	1,672,000	1,784,000	803,000	399,000	4,658,000
1922....	49,298,000	1,672,000	1,725,000	813,000	399,000	4,609,000
1923....	47,626,000	1,672,000	1,667,000	823,000	399,000	4,561,000
1924....	45,954,000	1,672,000	1,608,000	833,000	399,000	4,512,000
1925....	44,282,000	1,672,000	1,550,000	843,000	399,000	4,464,000
1926....	43,210,000	1,688,000	1,512,000	853,000	403,000	4,456,000
1927....	43,522,000	1,738,000	1,523,000	863,000	418,000	4,542,000
1928....	44,784,000	1,812,000	1,567,000	873,000	441,000	4,693,000
1929....	45,978,000	1,888,000	1,609,000	883,000	463,000	4,843,000
1930....	48,084,000	1,988,000	1,683,000	893,000	486,000	5,050,000

Mr. Schuyler testified that it was necessary to substitute covered conduits for the open canal.

"The total length of open canals, as given in Mr. Grunsky's report, is 27.83 miles. This section of open canal, after excavation, should, in my judgment, be filled with a reinforced concrete conduit of corresponding capacity to that of the ditch, and this work performed in a safe and proper manner, constituting permanent construction, I have estimated to cost about \$13.60 per foot, or \$71,800 per mile. This, for 27.83 miles, would be about \$1,998,000 as the total cost." (p. 5406, Schuyler.)

"Assuming Mr. Grunsky's figures as to the cost of the two pipe lines of the Tuolumne scheme, with the

additions for the lining of the canals and for the deficits in his estimate of the cost of the iron in the pipes, an additional pipe line of the same size as the other two would cost in the neighborhood of \$14,950,000, not counting interests during construction, or any additional expense for rights of way." (p. 5406, Schuyler.)

"I think Mr. Grunsky's estimated cost of the two pipe lines, with all the appurtenances which are necessary to be constructed and used in connection with them, is too low by a very large sum. His estimate for the entire works, for the storage and delivery of water, is \$30,724,000. His distributing system is estimated at \$8,807,000; a total of \$39,531,000. On careful examination and analysis of the details of this estimate I find it necessary to make certain substantial additions, to which I have heretofore referred, as follows:

For construction of a reinforced concrete conduit, 8 feet in diameter, as a substitute for the open canal, 27.83 miles long, at \$13.60 per foot.....	\$1,998,000
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For deficit in estimated cost of iron in pipe lines, amounting to an average of 2.3 cents per lb. on a total estimated weight of 279,422,000 lbs.....	6,426,700
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I also add 50 per cent. to the estimated cost of the pumps at the Belmont reservoir, for the purpose of increasing their capacity to meet needs, amounting to..	198,500
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I further add interest during the assumed construction period of seven years, at the rate of 4 per cent. for one-half of the time, or, a total of 14 per cent.....	6,741,615
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"The total of the items enumerated, added to Mr. Grunsky's total, makes the gross sum of \$54,896,000 as the probable cost of the entire system, with the additions which appear to me to be essential. Mr. Grunsky has omitted an addition of interest, although he has recognized in his report the necessity for mak-

ing provision for interest, but assumes that it would be paid out of the public revenue or tax-fund. This appears to be an improper evasion of a very large item which would appear in his estimates." (p. 5407, Schuyler.)

"I have not added in with that the estimated cost of a third pipe line. The addition of that figure would make a round sum of nearly \$70,000,000. This estimate presupposes that the water rights on the Tuolumne River cost nothing. The estimate of the City Engineer covers an allowance of \$918,000 for real estate and rights of way outside of the city and \$737,000 for reservoir sites and so forth in this city." (p. 5408, Schuyler.)

"Q. Assuming that the Spring Valley Water Company has an available average supply of 35,000,000 gallons daily for delivery, what would be the equivalent cost from the Tuolumne source, for the delivery of that amount, including the distributing system, in your opinion?

"A. According to the plans made by Mr. Grunsky the limit of size of pipe to be used is 48 inches, and the maximum capacity of each of the pipes is at the rate of 30,000,000 gallons per day. It therefore would be necessary to build two pipe lines in order to deliver 35,000,000 gallons; one of them delivering safely an average of 25,000,000 gallons, while the other one would have an excess capacity, upon the same hypothesis, of about 15,000,000 gallons daily, but inasmuch as it would be unwise and unprofitable to build any smaller pipe, considering the rapid increase of demand and the future growth of the city, it would be necessary and essential to build two pipes of equal size for the delivery of the stated amount. Therefore, to deliver that amount, would cost, as I have estimated, \$54,896,000. It does not seem logical or reasonable that the estimate should be in any way reduced because of the excess capacity that one of the pipe lines may have inasmuch as it would be, as I have stated, inadvisable and unwise to build any lines of smaller capacity." (p. 5409, Schuyler.)

On cross-examination he testified:

"The effect of the declared intention of the city to bring in a municipal supply from the Tuolumne would probably be to avoid the necessity for immediate extension of the plant of the water company to keep up with the growth of the city, and it would mean a division of the business between the city and the Spring Valley Water Company; but as the Spring Valley Water Company is well established it would probably have an advantage in securing business." (p. 5639, Schuyler.)

"I am pretty sure that if the city indulged in the luxury of the Tuolumne system, although it would furnish water at actual cost, the price would exceed the present price." (p. 5639, Schuyler.)

He also testified as to price of iron pipe referred to in Mr. Grunsky's testimony, as follows:

"It would not be possible to build such a pipe at the price which he estimates unless there occurs a more radical drop in prices of material and labor prior to the beginning of the construction of such a pipe than has ever been known to occur in the past. It could certainly not be produced under present market conditions." (p. 5399, Schuyler.)

"It is a well known fact, generally admitted, that the pipes of the Spring Valley Water Company, made of laminated iron, have actually lasted longer and been more durable by far than any other riveted pipes in existence made of the ordinary merchantable iron or steel. In view of this fact, and the low cost of maintenance of the system which such extreme durability permits, it becomes really an economy and a justifiable expense to incur the extra cost required to produce such results. I therefore would unqualifiedly say that such extra initial cost is justifiable." (p. 5399, Schuyler.)

Mr. Adams testified as to the cost of the two pipe lines, with appurtenances, for the Tuolumne scheme, as follows (p. 4681):

"Assuming Mr. Grunsky's report and attendant plans as the basis for my study and estimates, it is my opinion that the works as projected by him will cost, exclusive of the distributing system, the sum of \$44,523,000. This is for a plant having, according to Mr. Grunsky, a nominal capacity of 60,000,000 gallons a day, but having, in my judgment, not to exceed a capacity of 54,000,000 gallons per day."

Q. 119. In what respect do your figures of estimate differ from Mr. Grunsky's? Please state them in detail.

A. As a basis, I take Mr. Grunsky's figure of the cost of works, estimated by him to have a delivering capacity of 60,00,000 gallons per day, amounting to the sum of \$30,724,000, exclusive of the distributing system and its attendant reservoirs and pumping plants. In going over the details of his figures there appears to me to be certain important omissions which result in his estimate being an under-estimate of the probable cost. Those omissions I have added to the before-mentioned figure. His estimated cost per lb. of laminated iron in place, in readiness for the delivery of water, I regard as being at least 2 cents per lb. below its probable cost. There are 281,300,000 lbs. of iron, which, adding to his figure of 6.8 cents per lb., 2 cents, that is, estimating it at 8.8 cents instead of 6.8 cents, complete in place, indicates a requisite addition to his cost of \$5,626,000, on account of this item. My second addition is on account of substituting a closed structure for the 27.8 miles of open canal, and is estimated to increase the cost \$1,750,000. My third addition is an increase of one-half to the capacity of the Belmont pumping station, his estimate being on the basis of a 30,000,000 gallon delivery capacity, which is already exceeded by the demands of the consumers. This addition amounts, on the basis of Mr. Grunsky's figures, for a 30,000,000 gallon plant, to \$198,000. To these before-mentioned items I add 10% for contingencies, following the precedent of his report, amounting to \$757,000. I add a fourth item, on account of interest during construction, for which no allowance has been made in Mr. Grunsky's figures, he, however, calling

attention to the fact that there would be paid out of general taxation rather than by an issue of bonds chargeable against the water works, averaging $3\frac{1}{2}\%$ on the entire sum, for a period of four years, that is, contemplating eight years being required for completing the works. This item amounts to \$5,468,000. All these items together make, as a total addition to his figures, \$13,799,000, and a total estimated cost, for the entire system, exclusive of the distributing plant, of \$44,523,000.

Q. 120. Do you remember the figure he gives as the estimated cost of the city distributing system?

A. \$8,807,000.

Q. 121. And if you add this to your last figure what is the total result?

A. \$53,330,000.

Q. 122. If it would require, as in your opinion, eight years to complete this project, were it commenced to-day, what do you estimate would be the consumption in 1913, at the conclusion of the completion of this scheme?

A. Not less than 45,000,000 gallons daily.

Q. 123. Where, then, at the completion of the scheme or plant, would the factor of safety be in the two pipe lines, and what would it amount to?

A. If a reservoir of suitable capacity were constructed, the factor of safety would be the surplus delivering capacity at that time, which would not exceed 9,000,000 gallons a day.

Q. 124. Would you regard that as a safe factor to rely upon, namely, the surplus carrying capacity of one of two pipes, and the quantity of water which you have mentioned?

A. No, sir; I do not regard the enterprise as a whole as a safe proposition or one to be commended. This is but one of our numerous weaknesses inherent in the entire plan.

Q. 125. How long, in your opinion, would it require to build a third pipe line?

A. If the works, exclusive of the iron pipe, were built, in the first place, of a sufficient magnitude to per-

mit of the installation at a later date of a third pipe, that pipe might be installed in a period of perhaps three years after the letting of contracts; it might take more or it might possibly be done in a less period of time.

Q. 126. When ought the commencement of the construction of that third pipe line to be begun, according to your view?

A. It would have to be completed and ready for use not later than the year 1919. It would not be a prudent policy to defer construction too long. I should consider it desirable that it be completed one year prior to 1919, or, possibly, two years. (pp. 4681-2, Adams.)

Mr. Schussler testified concerning the value of the Tuolumne scheme as follows:

"The cost of the proposed Hetch Hetchy dam will probably be considerably increased over the city engineer's estimates, as well as the cost of the Tuolumne River conduit, if properly lined and covered as it should be with masonry or concrete." (p. 1563, Schussler.)

Again:

"In his (Grunsky's) estimate of cost the interest during the construction, amounting to several millions of dollars, has been omitted." (p. 1563, Schussler.)

Again: (p. 1563)

"I will assume that the lands and water rights on the Tuolumne River could be acquired, and the dams, canals, tunnels, power and pumping plants and power lines as proposed by the engineer, could be constructed for the sums estimated by him; also I will assume that his proposed city distributing system could be constructed for the sum estimated by him.

"If only the extra cost of the two main 48-inch pipe lines were added to his total estimate, and if thereto were added interest during construction, we would have the following results:

The total estimate of weight of the two 48-inch pipe lines is 272,664,000 lbs., which, according to our experience, will cost 11 2-3 cents per lb. complete in the ground, inclusive of 10 per cent. for incidentals and so forth. \$31,792,620

The estimate, made by the city engineer, of these two pipe lines, and inclusive of 10% for incidentals, etc., is. 19,098,420

Deducting the latter from the former figure we have an increase in cost on account of the two 48-inch pipe lines alone over the estimate of the city engineer of. \$12,694,200

"This item alone of additional cost, if added to the city engineer's total estimates of cost of the entire works, and inclusive of the distributing system, is as follows:

His estimate for head works, conduits, power and pumping plants and city distributing system is. \$39,531,000

To which should be added, on account of the greater cost of the two 48-inch pipe lines 12,694,200

Making a total cost of. \$52,225,200

for the works as planned by the former city engineer provided the pipe lines are built of the same standard material and workmanship as those of the Spring Valley Water Company, or, in round figures, \$52,000,000 instead of about \$39,500,000. (p. 1565.)

"This expenditure, if divided over five years during construction, would be probably expended at the following ratio:

First year	\$1,000,000
Second year.	5,000,000
Third year.	12,000,000
Fourth year.	18,000,000
Fifth year	16,000,000

"Allowing a ratio of interest on these part payments of $3\frac{1}{2}$ per cent. per annum we have a total interest account of \$3,045,000, payable during construction; or, in round figures, the interest during construction would amount to fully \$3,000,000. Adding this interest account, \$3,000,000, to the foregoing rounded off estimate of cost without interest, to wit, \$52,000,000, we have a total of \$55,000,000 as the cost of the proposed works, including two main 48-inch conduit lines of 30,000,000 gallons daily capacity each.

"Where the former city engineer assumes that the city's consumption will reach the extreme average daily capacity of his two 48-inch pipe lines only about the year 1950, he making no allowance for extra summer draught, or for one of these pipes acting as a safety pipe, he comes to the result that only about the year 1950 the third pipe line has to be constructed. From the Spring Valley Water Company's careful and very conservative estimates, as above shown, it appears that as early as 1920 instead of about 1945, as estimated by the city engineer, the average consumption through the year will be fully 55,000,000 gallons a day, which, allowing for from 10 to 15 per cent. extra daily draught during the summer, over and above the average daily consumption of 55,000,000 gallons, the city, during the summer and fall months of 1920 would require more than 60,000,000 gallons a day, or in excess of the extreme maximum capacity of the two 48-inch Tuolumne pipe lines combined.

"If the former city engineer's plans are carried out as proposed the works will be overtaken by the much more rapid increase in the city's consumption than assumed by him, with the result that his third pipe line would have to be constructed not later than between the years from 1917 to 1920 instead of, as he estimates, about the year 1950. This third 48-inch pipe line, to which must also be added third pipe lines on the Tuolumne River canal line will weigh, in round figures, 140,000,000 lbs., and will cost, if constructed of first-class American laminated iron, and with the best workmanship, both of Spring Valley Water Company's

standard, and inclusive of 10 per cent. for incidental and contingent expenses, engineering, superintending, etc..... \$16,320,000

To this sum add, for bridges, trestles, etc.
along the pipe line for this third line.. 210,000

Bear Gulch power station, increased about
50 per cent..... 180,000

Dry Creek power station, increased about
50 per cent..... 120,000

Transmission lines, increased about 50 per
cent..... 50,000

Altamont pumping station, increased
about 50 per cent..... 500,000

Adding 10 per cent. for incidentals, etc.,
for last five items of \$1,060,000, or... 106,000

We have a total of..... \$17,486,000

which it will cost, without interest during construction, to construct the third 48-inch pipe line, with all the necessary appurtenances, from the Tuolumne River to the receiving reservoir in the southern portion of San Francisco county.

To this sum of..... \$17,486,000

must be added, on account of the city's consumption of water having increased from 40,000,000 gallons a day in 1910—at the earliest period that this third line can be constructed—to 57,000,000 gallons a day average in about 1921, an amount not less than 20% of the cost of the original city distributing system, it having been gradually expended during the 11 years; that would be 20% of Mr. Grunsky's estimate of \$8,807,000, which he calls the cost of the city's distributing system, or.... 1,760,000

Making a total of..... \$19,246,000
or, in round figures, \$19,000,000.

The expenditure of this sum of \$19,000,000, requiring not less than four years, it beginning, we will assume, in 1917 and being completed by the end of 1920, would probably proceed at the following ratio:

1917.....	\$1,000,000 expended
1918.....	4,000,000 expended
1919.....	8,000,000 expended
1920.....	6,000,000 expended

Allowing for these part payments $3\frac{1}{2}$ per cent. interest, the total interest on this expenditure would foot up to about \$997,500, or, in round figures, \$1,000,000 for interest during construction. Adding this interest during construction..... \$ 1,000,000
to the above total expenditure for construction of 19,000,000

we have a total of..... \$20,000,000
representing the cost of the third pipe line of a carrying capacity of 30,000,000 gallons a day, including a proportional increase in the capacities of the power and pumping plants, as well as a 20 per cent increase in the cost and extent of the city distributing system. As heretofore stated, the original cost of the contemplated works, with two 48-inch pipe lines, was estimated at \$55,000,000

Adding to this the cost of these additional works, including the third 48-inch pipe-line, a percentage increase in the appurtenances, and a 20 per cent. increase in the city distributing system, or.... 20,000,000

We have a total cost of the Tuolumne works, when completed with the three 48-inch pipe lines, appurtenances and pipes in city, of..... \$75,000,000
(pp. 1563-8, Schussler.)

See also the table showing cost of water supply from the Tuolumne River with the estimated cost per thousand gallons, at p. 1571 Schussler's testimony.

4. SUMMARY OF VARIOUS ESTIMATES OF COST OF TWO-PIPE LINE TUOLUMNE OR HETCH HETCHY PLANT.

Hering	\$55,000,000.	(p. 3475)
Schuyler	\$54,896,000.	(p. 5408)
Adams	\$53,330,000.	(p. 4683)
Schussler	\$55,000,000.	(p. 1568)
Grunsky	\$39,531,000.	(p. 280)

(All the estimates include interest during construction, except Mr. Grunsky's.)

VIII. WITNESSES:

1. COMPLAINANT'S WITNESSES.

2. DEFENDANTS' WITNESSES.

(a) Desmond Fitzgerald.

(b) E. Duryea.

(c) J. H. Dockweiler.

[Including table showing rates of fourteen cities (when modified as to taxes) as compared with San Francisco.]

(d) C. E. Grunsky.

1. COMPLAINANT'S WITNESSES.

We dare to assert that never in the trial of such an important case has a litigant more fully, frankly and freely laid bare every portion of its records. The testimony of the chief engineer of complainant is included

in the first eight volumes and practically covers 3000 pages. It gives in detail the present cost of construction of the works and the reason for the expenditure of almost every item. This is followed up by the valuation of Rudolph Hering the eminent specialist on hydraulic engineering of New York and Philadelphia, Frederick P. Stearns, the eminent specialist of Boston, Arthur L. Adams, the specialist of Oakland, James D. Schuyler, the specialist of Los Angeles, whose standing in their profession makes it impossible that they should not be acting in the highest good faith. Their testimony is strengthened by the testimony of William R. Eckart, the mechanical expert, and Benjamin C. Wright, the statistical expert. George B. Reynolds, an expert accountant, gives in minutest detail every financial transaction that has occurred in the affairs of the company from its inception, shown in comprehensive tables as Exhibits which tell complainant's whole story from a financial viewpoint, in graphical form, and his conclusions are reached from the practical way of estimating interest, dividends and costs as they actually occurred. William Brooks, who handles the real estate and taxes for the complainant, also laid bare every record in his office. The appraisement of San Francisco properties by Mr. A. S. Baldwin, the real estate expert of San Francisco, shows that so far as the San Francisco properties are concerned they have elements of value which alone make it impossible for the figures accepted by Judge Morrow at the time of the issuance of the preliminary injunction to be attacked, and also show conclusively that the valuations accepted,

except as being hopelessly below the actual present value, were evidently accepted because sufficient (though low) for the purposes of a preliminary injunction. Mr. Cyril Williams testified as to the cost of certain elements and of certain construction. The affidavits as to proper per cent return on this class of investments, used at the hearing on the preliminary injunction by stipulation, were accepted as testimony.

2. DEFENDANTS' WITNESSES.

(a) Desmond Fitzgerald.

(b) E. Duryea.

(c) J. H. Dockweiler.

[Including table showing rates of fourteen cities (when modified as to taxes) as compared with San Francisco.]

(d) C. E. Grunsky.

Against this testimony we have the evidence of Robert Higgins, J. S. Emery and John Casey, who testified about the cost of certain portions of work done for the company twenty years before the trial of the case.

Their evidence being based upon primal cost is practically valueless because not the proper basis for determining the value of property—it is only an element—the testimony of cost being directed at such a remote period that it is almost an immaterial element in the present value. The fair, equitable value of the property used and useful, estimated at the time of its use, is the question here under investigation.

The experts produced by defendant are Mr. Duryea,

a man whose experience has been with but one plant, the Bay Cities Water Plant, which hoped prior to the time of the "graft" investigation in San Francisco to become a rival of complainant; Mr. Desmond Fitzgerald, a learned engineer from Boston, almost entirely unfamiliar with San Francisco conditions, who based his testimony on primal cost only; Mr. Dockweiler, an engineer who never has solved any large engineering problems himself and who spent practically two years on a salary from the City compiling figures from other cities which he himself admits to be of little or no practical value, and Mr. Grunsky, ex-City Engineer, who only differs from complainant's experts in amounts and in omitting elements of value which he determined should be omitted because included in property not used and useful for supplying water, notwithstanding that our courts have held that such elements must be included.

As the three engineers first named only testified as to one element of value, we will discuss their testimony, first, as they can be easily eliminated from much consideration.

(a) *Desmond Fitzgerald's Testimony.*

Mr. Fitzgerald quarreled with the law and Judge Morrow's decision as a basis of valuation from the start, and specifically testified that the values given by him were based only on cost. He says: (p. 430)

"It seems to me that any other basis than that of the cost in connection with this case, will lead to many difficulties and will not be as just. The value of the plant upon the basis of cost takes everything in use for

supplying water exactly as when first obtained and deducts nothing for depreciation, and, on the other hand, allows nothing for appreciation or increase of value. I have kept steadily in mind in forming a basis for the valuation in this case, that it is desired to find an appraisalment of the company's property for the purpose of fixing rates or revenue, which, it seems to me should depend upon the amount of expenditures. I did not in this case try to find the worth of the property for purposes of sale, which may depend upon a different basis, such as the intrinsic value of the plant, taking into consideration its probable life, and also, on the other hand, the increased value which may have taken place in the works."

Judge Morrow has followed Judge Van Fleet's decision in the case of *San Diego Water Company v. San Diego*, 118 Cal. 556, where the principle is laid down:

"The question of what is just compensation in such a case is, we think, in all respects analogous to the question which arises in every case of appropriation under the power of eminent domain; and it may be reduced to the formula that the public must pay the actual value of that which it appropriates to the public use."

The principle of eminent domain includes the element of cost as a single factor only, in determining the present value of the property at the time of taking. Mr. Fitzgerald's valuations therefore (wherein, as he says himself in the testimony last quoted, he did not try to ascertain the worth of the property at the present time, but only the value of the plant upon the basis of cost), becomes absolutely immaterial. Nevertheless the figures given by him (p. 433) establish a value of \$22,736,643.55, without taking into consideration franchise,

or value as a going business, and notwithstanding the fact that he specifically states, after giving the table furnishing these values, "this table, as already mentioned in the title, is based only upon the actual reasonable cost of construction *at the time the works were built*, and the cost to the company of its lands, both of the sources of supply and in the city. It is difficult to ascertain the original cost of the structures in many instances." (p. 434.) It conclusively shows that this learned engineer whose entire experience in California was from visiting the works of the Spring Valley Water Company in the early part of 1903, has attempted to apply the system of values established in a conservative community like Boston, where land values are comparatively stable, as they are in old established communities, and not in accordance with values existing in a new community such as San Francisco was when complainant purchased a large part of its properties (1858 to 1870).

The reason for the rule that the present values must be taken, is well illustrated if the court remembers that a great part of the most valuable portion of the complainant's dams was built at a time when it was borrowing money at from $1\frac{1}{4}$ to 2 per cent per month, and when the local situation was as stated by Professor Plehn as follow:

"A few facts concerning the history of California will, perhaps, help to explain the difference between these rates (interest rates) and those that have prevailed elsewhere. Railroad connections with the east were completed in 1869. Prior to that time California was isolated, was a new country, and all the

economic conditions were peculiar. Capital was comparatively scarce and opportunities for its investment were innumerable. Hence the rates of interest were abnormally high. The current rates in the early days were quoted at $1\frac{1}{2}$ to 2 per cent per month." (Defendant's testimony page 616.)

Had the learned engineer taken into consideration the fact that these properties were acquired at a time when land was of comparative little value, because outlying and remote, and that money was worth from $1\frac{1}{2}$ to 2 per cent per month, we feel quite certain that he would not have attempted to reform the rule as to valuation of property laid down by Judge Van Fleet.

The California Supreme Court has recognized the following rules for appraising property in the matter of eminent domain:

"The condition of the property, the uses to which it may be put, having regard to the existing advantages for making a practical use of the property, and such advantages as may be reasonably expected in the immediate future, are all matters for consideration in estimating the value of the lands."

San Diego Land Co. v. Neale, 88 Cal. 50, 66.

All these elements, except primal cost, were confessedly and designedly omitted by the learned engineer, thereby making his testimony so hopelessly incomplete as to be negligible.

Judge Van Fleet very appositely explains the reason in this class of cases as follows:

"The construction of municipal water works is a matter of growth. . . . As such works are a necessity to the city, they must keep pace with and to some extent anticipate its growth. . . . It results that at least

the first water system in any city occupies the position of a pioneer. At any expense the works must be constructed and usually no reward can be realized by the constructors until some time has elapsed. . . . It would therefore be highly unjust to permit the consumers to avail themselves of the plea that at the present time similar works could be constructed at a less cost, as a pretext for reducing the rates to be paid for the water. The reduced expense, if it be reduced, is due in part at least to the very fact that the city has been provided at the cost of the water company, with increased facilities for doing business."

San Diego Water Co. v. San Diego, 118 Cal. 556, 568.

And in an eminent domain case arising out of a water condemnation, the Supreme Court of California recognized as correct law an instruction reading:

"In determining the actual value at the date of the summons (which would here be at the date of the fixing of the rate), you are not to take as the measure of that value what an owner could realize at a forced sale, but the price he could obtain, after reasonable and ample time, such as would ordinarily be taken by an owner to make sale of like property; and in making that estimate you should consider the use for which the property is suitable, having regard to the existing business or wants of the community, or such as might have been reasonably expected in the immediate future. . . . and from these and all other uses to which the property may be put from which profit may be derived, and from all the evidence on the subject, you will determine its actual market value at that date."

City of Los Angeles v. Pomeroy, 124 Cal. 641-2.

And this is but a different method of stating the basis of valuation for country property as set forth in the California Statute of 1885:

"Said boards of supervisors in fixing such rates, shall, as near as may be, so adjust them that the net annual receipts and profits. . . . shall be not less than six nor more than eighteen per cent upon the said value of the canals, ditches, flumes, chutes, and all other property actually used and useful to the appropriation and furnishing of such water. . . . Each of said boards of supervisors may likewise take into estimation any and all other facts, circumstances and conditions pertinent thereto, to the end and purpose that said rates shall be equal, reasonable and just, both to such persons, companies, associations and corporations, and to said inhabitants." (Stats. of 1885, p. 96.)

Consequently, as the learned engineer has not attempted to place the valuations upon the principles established by the courts as the proper basis for estimates, his valuations can have no weight, because they are irrelevant and immaterial tabulations of bare costs without taking into consideration present values. In other words, he has used but one element in ascertaining present value and left out of consideration all other elements.

The courts have decided that cost is merely one of the elements of present value.

See *Kennebec Water Dist. v. City of Waterville*, 54 Atl. 7-18.

"The construction cost is admissible but not controlling on question of present value."

See also on this point:

State v. Minneapolis & St. L. R. R., 83 N. W. 60.

Brunswick v. Maine Water Co. 59 Atl. 537.

(b) *E. Duryea.*

Mr. Duryea, while a member of the American Society of Civil Engineers, has never been connected with any big water works, except the Bay Cities system, which his company was (in 1905) attempting to sell to the city, and it takes four pages of testimony (p. 51 to 55) to show the number of bridges and other work (not water work) on which he was employed as *assistant* engineer, and then, after giving the valuation of the system of the company represented by him at \$25,451,000 (p. 68) he admits on cross-examination that this did not include the rights of lower riparian owners to any of the streams from which his company gets water (page 85), and naively admits that if they were compelled to own their riparian rights it would increase his estimate very materially (page 82). He also admits that his company does not own certain strips of land adjoining the reservoir sites contemplated, and that without the strips in question the reservoir would hold one-half less (page 73); also that the land had been in litigation and in an attempt to condemn the land a decision had been rendered adversely to his company. He also admits that he would be unable to increase the water delivered from his property in question without duplicating his pipe-line (page 75) at a cost of about \$17,000,000. He also admits that he has never laid a water pipe and knows nothing about the cost of water pipe personally, and that the estimate of the cost of a duplicate water pipe over fifty-six miles long was

made "in a very rough way" (page 97), and to the question asked him

X. Q. 268. (p. 87) And that estimate (as to cost of pipe line) you really do not know anything about, except what these men told you in conversation and what you told them in conversation about what you thought you wanted?

He answered:

A. That was about it, yes sir.

He allowed nothing whatsoever for the cost of right of way (p. 92) relying entirely upon the possibilities of using the county road, and admits that the two pipe lines referred to by him would each require trenches ninety-two inches ($7\frac{2}{3}$ feet wide), by eighty-six inches deep (page 103), and admits that it would be necessary to have these a considerable distance apart so as to minimize the possibility of the same accident damaging both. We assume that the court will take judicial notice of the fact that few county roads in the traveled part are over $15\frac{1}{2}$ feet wide (the total width of witness' two proposed trenches). He admits that his figures for laying the pipe were based upon the work of an instrument called a trenching machine for building trenches; and the general unreliability of his testimony can be shown by the following series of questions on cross-examination. (p. 107.)

X. Q. 351. "Have you ever seen one of the machines?

A. "I figured on no special machine. I got the performances of a number of machines and I used the highest figures."

X. Q. 352. "Have you ever seen one of them work?"

A. "I have."

X. Q. 353. "Where?"

A. "Not in this State, but in the East."

X. Q. 354. "One of the machines running as large a trench as this you speak of?"

A. "I said I did not use any special machine. I got the cost of excavation, per yard, from a number of records of different machines."

X. Q. 355. "Did you get the record of any trench being excavated by a machine—I mean as large as this trench you speak of, namely, 92x86?"

A. "I think I did, but I cannot be sure as to that or as to where the trench is."

X. Q. 356. "Do you know whether it is feasible to excavate a trench of that size by a trenching machine?"

A. "I believe it is."

X. Q. 357. "But you have never had any experience?"

A. "No."

X. Q. 358. "Have you ever read of a trench of that size being excavated by a trenching machine?"

A. "I should say I have."

X. Q. 359. "Do you know where?"

A. "No, but very generally, I should say in the pages of the Engineering News."

X. Q. 360. "As a matter of fact do you know that this trench can be dug by a trenching machine?"

A. "I should say from the experience I have had in railroad work and dam construction and excavation of trenches, etc., that I believe it can."

X. Q. 361. "Have you ever excavated a trench with a trenching machine?"

A. "Not with a trenching machine, no."

X. Q. 362. "And you have never seen it done?"

A. "I said I had seen it done in the east."

X. Q. 363. "But I say as large as this?"

A. "I said I did not know as to the size. I did not say as large as this."

X. Q. 364. "Where did you have any experience with a trenching machine constructing dams?"

A. "I never had any experience myself with trenching machines. I said I had seen work done with trenching machines."

X. Q. 365. "Whereabouts?"

A. "In the East."

X. Q. 366. "Whereabouts in the East and on what dam?"

A. "I have dug trenches in connection with three of the dams of the New Croton Aqueduct. One is called the Titicus dam, another is called the Carmel, and the third is called the Craft Station dam."

X. Q. 367. "Were those done with trenching machines?"

A. "They were not; they were done with derricks. I told you, to begin with, that I have had no personal experience with digging trenches with trenching machines."

X. Q. 368. "It is simply your opinion that it can be done. You do not know it as a matter of fact, from seeing it done or from reading about it. As a matter of strict fact, that is true, is it not?"

A. "As a matter of strict fact that is true, yes."

And then he admitted on cross-examination that his reservoir sites were not sufficient to protect the city from water famine to exceed nine days. (page 117.) He also admitted that he had never built a water works (page 118), but seemed to feel that his figures should be accepted because he had engaged in *reporting* on a water works at Bakersfield.

This line of examination gives us a very good idea as to what experience this engineer seems to think fits a man for making accurate estimates:

X. Q. 454. (p. 118) "I understood you never have built any water works yourself?"

A. "I have never built any pipe lines."

X. Q. 455. "Have you ever run any water works?"

A. "I have not. I have done very considerable in the way of building dams and such structures."

X. Q. 456. "Your conclusions on all these subjects are really theoretical and not practical, are they not?"

A. "Not entirely so. I am now engaged *on reporting* on the water works at Bakersfield, California, for their improvement. I have not constructed any water works."

X. Q. 457. "And you have not operated any?"

A. "No, I have not operated any."

The system suggested by the witness was intended to take storm waters only. The question was asked:

X. Q. 478. (p. 120) "Has there been any establishment, in any way, shape or form, legal or otherwise, of the ordinary flow of any of these streams that you have mentioned?"

A. "I do not know that there has been."

* * * * *

X. Q. 481. "And as to all the rest it is simply your opinion as to what the ordinary flow is and what the storm flow is?"

A. "That is the case, yes."

X. Q. 482. "Then, in making the figures you have made as to the quantum of water that might be stored, you were relying entirely upon your construction of the law and your opinion as to what the ordinary flow of the stream is, and you took the balance as storm waters?"

A. "That is it, yes sir."

X. Q. 483. "And if it should be proven otherwise in any respect whatever, then your amount might be either increased or diminished?"

A. "Yes sir, it might be."

Then he admitted that no arrangements had been made for compensating lower riparian owners for the

deprivation by them of water which might infiltrate in the gravel beds below from storm waters (p. 125), and then to the question asked him:

X. Q. 528. (p. 125) Then, as a matter of fact, the figure of \$25,451,000 is not a reliable figure, considering those other things, and is not a fixed and firm figure, is it?

He answered:

A. "I believe it is a reliable figure because I do not think those other things need to be considered. I am aware that that is a legal question."

X. Q. 538. (p. 126) Would it be a reliable figure upon which to base a comparison of the value of other water works?

A. "Not if your assumption were true."

The watershed about which Mr. Duryea testified, is to the east and south of San Jose for from 20 to 40 miles. The streams at present flowing therefrom cross Santa Clara Valley for from 30 to 50 miles before reaching tide water.

As the law of this State is so firmly settled that the riparian owners have a right to the quantity of water flowing past their property, either above or below ground, undiminished in quantity, except for use in upper riparian properties, or where rights of removal to distant points have been established by prescription, we feel certain that this court will decide with the witness himself that since the condition precedent as suggested by him, is established, the figures given by him are unreliable and unworthy of further examination, especially when we take into consideration the fact that the witness admits that from fifty to fifty-five million

gallons per day is the greatest possible amount that could be delivered from the system suggested by him unless it be joined to another Sierra Nevada system of a similar kind to the Tuolumne system, concerning the value of which his testimony was even more vague than that concerning the Bay Cities.

Finally, he himself testified in such a way as to read all value out of his testimony for purpose of this case, as follows:

X. Q. 395. (p. 311) "Do you consider water works that have a limit of that size as valuable as water works which have a larger limit as their minimum?"

A. "No. The larger the supply the greater the value, but as an addition to the Spring Valley I would consider this very valuable."

X. Q. 397. "But you would not compare it (the Sierra system) with the Spring Valley?"

A. "Yes, I would compare it with the Spring Valley and say I think it more valuable as it gives more water."

X. Q. 398. "Do you mean the Spring Valley as developed, or the Spring Valley as capable of development?"

A. "The Spring Valley as developed."

X. Q. 400. "Assuming it is capable of development to three times the amount it is now supplying, is it not a more valuable scheme than the one that is supplying 50,000,000 gallons?"

A. "It certainly is."

Mr. Duryea took as the value of his iron pipe six cents per pound. This estimate was given because of a chance conversation between himself and a subordinate connected with a company selling pipe. (p. 106.) The items constituting elements of this cost were unknown to him.

His testimony in chief on this matter was as follows (p. 66) :

"Q. 72. What price per pound for the iron in this pipe line was used in your estimate?

"A. $3\frac{3}{4}$ cents per pound for plates delivered in San Francisco.

"Q. 73. What price per pound did you use for the pipe complete in trench?

"A. I estimated the trenching as a separate item and all of the items separately, but the final result was 6 cents per pound.

"Q. 74. Complete?

"A. Complete.

"Q. 75. What would your previous testimony then point to as a fair value for the Bay Cities Water Companies' Santa Clara County system, with works completed to store enough water to give an average daily gallons per day in dryest years, and with two riveted iron pipe lines to carry the same to San Francisco?

"A. \$16,344,000. This includes the ownership of the entire mountain catchment area." (pp. 66-67.)

His cross-examination was as follows: (p. 95.)

"X. Q. 251. How about steel on the same proposition—in respect to its life?

"A. I can only say that *other engineers* older than myself have decided that steel is sufficient for the purpose, and I believe so.

"X. Q. 252. Do you know of any instances where steel oxidizes with great facility when it is used in water mains?

"A. I do not know of any specific instance. When the specific instance arises it is probably due to electrolysis.

"X. Q. 253. Will you give me a list of the large water mains you have laid in your experience?

"A. *I have laid no large mains.* I have laid some pipe through dams, and so forth.

"X. Q. 254. Where?

"A. In New York City.

"X. Q. 255. How long were they?

"A. They were not long, but they were large; probably *200 or 300 feet long.*

"X. Q. 256. You have laid no mains, have you?

"A. No.

"X. Q. 257. What are your figures which make up 6 cents per pound for the kind of iron you mentioned as being laid in the trench?

"A. Those figures are as follows: Cost of plate in San Francisco, $3\frac{3}{4}$ cents per pound; manufacturing, 1 cent per pound, making $4\frac{3}{4}$ cents per pound for the pipe manufactured. The manufacturers' profit I have figured at 20 per cent, which brings the price of the pipe up to 5.1 cents per pound. Freight, estimated at \$10 per ton, and you must remember that the freight is only between here and San Jose and that the average distance is thirty miles, and

with frequent stations; I got that rate from the railroad. The hauling is estimated at \$5 per ton; that is due to the very small haul, there being a great many stations between here and San Jose, and the haul is small. The trenching is estimated at \$1000 per mile, which, with the easy country between here and there, and with the use of trenching machines, which are extensively used, is a large rather than a small figure. The refilling is estimated at \$250 per mile. That makes the total cost of the 56-inch pipe, if it were reduced to the pipe in trench, 5.99 cents.

"X. Q. 258. Which you call, in round numbers, 6 cents?

"A. I call it, in round numbers, 6 cents. Then, in addition to that, after estimating, I add 10 per cent for cost of minor structures, such as valves, etc., and five miles of trestle across the San Bruno marsh. (pp. 95-96.)

"X. Q. 260 (p. 97). Do you know of any pipe that has been laid on the basis of the figures you have given—I mean in California?

"A. *No; I cannot positively state I do.* I do know I got these figures for the making of pipe, and laying it, from contractors who were willing to do it at that price.

"X. Q. 261. What contractors?

"A. I do not think I care to give out their figures in that way; I received them in confidence. They gave me not only the price, but the details of the price. I do not wish to name them.

"X. Q. 262. I will not insist upon that. Do you know of any pipe of this character which has been laid for that price, 56-inch riveted pipe?

"A. *No; I do not.*

"X. Q. 263. What are your specifications for the construction of this pipe—how close together do you set the rivets?

"A. I have not worked it out in that detail. I worked out the rivets in a rough way for the butt-joints; I do not remember just what they were.

"X. Q. 264. When you gave your specifications to the contractors who were willing to bid 1 cent for pipe manufactured and laid, did you not specify to them how many rivets you were going to use and what character of work they were to do?

"A. *In a very rough way.*

"X. Q. 265. Their estimate was a rough one, was it?

"A. A rough estimate, which, at my request, was made high. They were told I did not want a close figure—that I wanted a high figure.

"X. Q. 266. But without any written specifications?

"A. Yes.

"X. Q. 267. And only in a general way?

"A. Yes.

"X. Q. 268. And that estimate you really do not know anything about except what these men told you in conversations and what you told them in conversations about what you thought you wanted?

"A. That is about it, yes, sir.

"X. Q. 269. When you estimated the cost of manufacturing and laying the pipe, complete in the trench, at 6 cents, did that include the 20 per cent for incidentals?

"A. That includes the 20 per cent, yes. It includes 20 per cent added to the cost of the pipe, which I call contractors' profit, and it includes, in addition to that, 10 per cent which is added for what you call contingencies. (pp. 97-98.)

* * * * *

"X. Q. 279. (p. 99.) "What firm offered to lay that down in San Francisco at the figure you mentioned?

"A. I told you I preferred not to mention that. It is not a lump sum, but they gave me the details by which they would make up this price, and I do not care to mention the man who gave me those details.

"X. Q. 280. Was it a San Francisco firm or an Eastern firm?

"A. It was a San Francisco firm.

"X. Q. 281. The plates were to be made here?

"A. No; they were to be delivered here in car-load lots from the East. The prices they gave me were considerably below these. I used these by simply adding something to them.

"X. Q. 282. Have you any objection to saying where they were to be made in the East?

"A. I did not inquire as to that.

"X. Q. 283. Did you see a sample of the iron that was to be furnished?

"A. I did not.

"X. Q. 284. You do not know what it was, except from what he told you?

"A. That is all.

"X. Q. 285. Would you purchase iron without knowing what it was, or seeing it?

"A. Not without inspecting it.

"X. Q. 286. You do not know whether this iron that was offered would pass inspection or whether it would be accepted by you or not?

"A. I assume it would. If it would not fill the very general ideas I gave him it would not be accepted; it would not be paid for.

"X. Q. 287. When you make an estimate of the cost of a thing of that kind in your opinion, you, of course, have some idea as to what kind of iron you would accept and what kind you would not accept?

"A. Yes, sir.

"X. Q. 288. How do you know that this iron would fill the bill of what you intend to demand of them?

"A. I would have to take their word that they would furnish the kind of iron what was called for, and at that cost.

"X. Q. 289. You did not give them any written specifications?

"A. *No; I did not.* They did not give me $3\frac{1}{4}$ cents. That is my price. They gave me a figure a great deal less than that.

"X. Q. 290. You do not know whether the price you made would buy good iron because of any investigations you have made or because of furnishing specifications to bid upon?

"A. From general investigations in the past I know it would be good iron. (pp. 90-100.)

* * * * *

"X. Q. 300. (p. 102.) Was that in your specifications to the contractor?

"A. While I did not mention that I looked up the size of plates and found that sheared plates would fill that requirement.

"X. Q. 301. You did not tell him you were making his bid on sheared plates?

"A. No; I did not tell him, but I increased his price in a very considerable amount—an amount which would more than take care of any change like that.

"X. Q. 302. What size trench were you going to lay this pipe in?

"A. A 56-inch pipe it was, and the trench would be made enough larger than the pipe to allow for the riveting.

"X. Q. 303. How much larger? In making your estimate of the cost of \$1000 per mile, what size trench did you allow for?

"A. I do not remember what size now.

"X. Q. 304. Would you not necessarily have to know the size when you estimate as so much per mile or so much per foot?

"A. I figured a long time ago the price of this trenching, and I know that \$1000 per mile would be very ample. (p. 103.)

* * * * *

"X. Q. 339. (p. 106.) Did you say you had a bid on that proposition from some San Francisco firm?

"A. *I did not say it was a bid.* I said it was a figure given to me confidentially by a very competent man who is with a large firm of pipe-makers here in San Francisco.

"X. Q. 340. Is he one of the firm?

"A. No; that is, I do not know that he is.

"X. Q. 341. Is he a clerk?

"A. No; he is not a clerk.

"X. Q. 342. You do not know whether you can get the work done for that figure, or not, do you? It is simply that man's opinion, is it not?

"A. *Well, he is at the head of a department.*

"X. Q. 343. You did not ask him for a bid; you simply asked him for his opinion?

"A. I did not ask him for his opinion; I asked him to give me a safe figure.

"X. Q. 344. Does this firm that you speak of manufacture riveted pipe?

"A. It does.

"X. Q. 345. Have you any objection to disclosing their names?

"A. I should prefer not to for the reason I gave—that they gave me those figures in confidence, not expecting them to be made public, and they gave me much more in detail than they would if merely making bids.

"X. Q. 346. In getting the price of this pipe, laid down in San Francisco, was it in the shape of a bid?

"A. *Not in the shape of a bid.*

"X. Q. 347. It was simply talk?

"A. *Simply talk.*

"X. Q. 348. In estimating the trench at \$1000 a mile, will you give me your details for that?

"A. I cannot give them to you more than I have, because I have not the data here. I have made a number of figures of the cost of trenching per mile, on the basis of trenching machines, and this is what this is based upon." (p. 106.)

The relative value of all this testimony is shown by his answer on cross-examination, as follows:

X. Q. 539. (p. 126) Have you had any personal experience as to the lasting quality of either iron or steel pipe and their relative lasting qualities?

A. *"Not in the sense that work has been done under me."*

Contrast this with Mr. Schussler's testimony on the cost of iron pipe. He gives it as his experience and opinion that wrought-iron large pipe is of the standard value of 10.6 cents per pound exclusive of ten per cent for incidentals and contingents—such as engineering, superintending, and other expenses. This is from actual experience, with all drawbacks known and cured by forty years' trial and *successful operation*.*

*Mr. Schussler testified:

"This 10.6 cents per pound is the average cost of this kind of pipe placed in the ground complete, with the water turned on ready for service and in service, under full pressure. It includes the importation of the iron from the East; it includes the careful inspection in the rolling mills in the East of every plate of iron sent; it includes first-class rivets manufactured for us especially, and shipped out here; it includes the freight, both on plate iron

Footnote, continued.

and on the rivets, delivered into the machine shop in San Francisco that manufactured the pipe; it furthermore includes all the labor of punching the iron, rolling it, riveting it, shipping, splitting and caulking the iron at the joints in the very best boiler work fashion; it includes the dipping of the pipe in lengths, generally from twenty-five to thirty feet long, in two coats of asphaltum preparation, which is very carefully prepared, mixed and boiled to the proper temperature by experts in our employ; it includes the shipping of this pipe to a depot near the point where the pipe is to be laid—to a distributing center, so to speak—where that pipe is stacked up and covered with plank so as to keep the sun away from it, and thus prevent the melting off of the asphaltum; it includes the cost of loading each pipe individually on a wagon and hauling it along the pipe line; during this transportation on the wagon it is covered by wooden slats and a canvas covering over the same, so as to keep the sun off from it. This same covering is again placed on it when the pipe has been unloaded on the ground near the ditch into which the pipe is to be laid. This price also includes the digging of the trench for the reception of the pipe; the digging of the joint holes; the very careful trimming of the bottom of the ditch to a perfect grade so that the pipe has bearing on its entire length; it also includes the lowering of the pipe into the ditch; the entering of the next pipe into the one that has already been laid; the riveting together of these lengths of pipe by perfect work, of the same quality of work as the best boiler work; thereafter these joints are chipped, split and caulked in the best boiler work fashion; meanwhile the pipes are covered so as to prevent the sun from melting the asphaltum. The pipes also, for every other sheet or plate, receive a concrete saddle on each side, so as to give the entire length of the pipe an even bearing all along, that is, to prevent the uneven settling of the pipe in case any portion of the line, during a coming storm, should be saturated with too much water. These saddles that are built under the pipe every nine or ten feet, carry the pipe, and thus prevent local settlement of any portion of it; it also includes the careful filling in of first-class material into the ditch outside the pipe, ramming the same with short rammers, the men being on their knees alongside the pipe and ramming this earth and material carefully and tightly underneath the pipe and all around the pipe and over the top of it, thus carefully filling the ditch again, with an occasional sprinkling of water so as to still more consolidate the material, until the ditch is finally filled up, the last portion of the earth, that is, the top soil, being scraped into it by scrapers; thereafter the pavement on the street is restored again in the same manner, or fully as good a manner as it was before the ditch was cut. The price furthermore includes the proportionate cost of all fittings, such as man-holes, air-valves, vacuum-valves, blow-offs, elbows, strap-joints, bridges over creeks, with concrete piers and steel

Footnote, continued.

I-beams; it also includes the thorough repainting with paraffine and asphaltum paint of the joints that have been made in the ditch, both in and outside of the pipe. In short, the price that I have mentioned of 10.6 cents per pound includes the cost of the pipe per pound of plate iron used in the construction of this pipe, which means not only the plate iron used in the construction of the main body of the pipe, but also the strap-iron which is used at curves and elbows, which strap-iron is of a higher grade of iron, which we call flange iron." (pp. 1199-1202.)

* * * * *

"The details composing this construction and connection of the 54-inch Alameda pipe line are as follows: I shall now give the detail cost of each item of cost and divide it by the number of pounds of plate-iron used, as has been the custom all through our works, as well as all through these estimates. The 3,005,000 pounds of plate iron and flange iron used in this pipe cost \$146,500. Dividing this by 3,005,000 pounds of plate iron, we have the average cost of plate iron in this pipe delivered here, which includes the freight, handling, switching cars, unloading plates, inspector's expenses in the East, cleaning plates and removing them from one point to another in the shop.....4.87c

"Cost of rivets delivered to the shop in San Francisco: 60 tons of rivets delivered to the pipe shop in San Francisco, in round figures, \$5000; \$5000 divided by 3,005,000 pounds of plate iron0.17c

"Cost of manufacturing and laying the pipe: Pipes manufactured and laid, and a small piece of what we call 'safety pipe' made but not laid—we keep that on hand for repairs in case of any accident happening—extra compensation for extra work in the shop for patching the pipe that had flaws; inspector in shop and on pipe line, putting on 105 straps on the pipe line to make curves and elbows, 22 man-holes, 8 air-valves complete, 8 blow-offs, and including the furnishing of these man-holes, air-valves and blow-offs, \$102,000. Dividing \$102,000 by the weight of plate iron used, to-wit, 3,005,000 pounds, we have the cost of the mechanical work of manufacturing and laying the pipe, per pound of plate iron in the pipe...3.39c

"Cost of dipping the pipe in two heavy coats of asphaltum coating, which includes the shed and the trestles, the use of the dipping trough and the hoisting machinery, the cost of the asphaltum, the coal tar, the firewood, some repairs on the kettle and the labor of dipping and handling the pipe until it is cooled off and ready to be shipped, \$12,300. Dividing \$12,300 by 3,005,000 pounds, we have the cost of dipping, per pound of plate iron used in the pipe.....0.41c

"Freight from San Francisco to Millbrae, including the loading of it on to the cars at the shop, the railroad freight from San Francisco to Millbrae; also the freight on all the fittings

Footnote, continued.

that were sent out; also a charge for switching and demurrage, in round numbers, \$5000. Dividing \$5000 by 3,005,000 pounds, the total weight of plate iron in the pipe, we have for this freight per pound of plate iron used in the pipe.....0.17c

"The next item is the labor of hauling the pipe from this distributing center at Millbrae—loading it on to wagons, as I have described heretofore, and hauling it out to the place where it is to be laid—carefully depositing it on the bank, covering it up against the sun's influence, digging the trench, cutting the joint holes, and, in short, all the labor that is necessary to lay the pipe complete, outside of the mechanical labor that I have already stated—reproducing the road again in the same or better state, or fully as good a state, as we found it before we cut the trench; this also includes all the board of the men; it includes the following labor: Foremen, under foremen, time-keeper, inspectors, machinists, carpenter, blacksmith, night watchman, laborers, four-horse teams, one-horse teams; brick-layers and bricklayers' helpers—the brick-layers and brick-layers' helpers were required to build and repair some man-holes in the Burlingame sewer, which were in the way of our pipe and which we had to reconstruct. Total cost of such labor as above enumerated, \$56,000. Dividing \$56,000 by 3,005,000 pounds of plate iron, we have, per pound of plate iron of the pipe1.86c

"Recapitulating these various items of cost of the 54-inch pipe, we have:

"For the iron plates delivered in San Francisco shop.....\$146,500=4.87c

"Rivets delivered in the shop..... 5,000=0.17c

"Manufacturing and laying mechanical work..... 102,000=3.39c

"Dipping in asphaltum, complete, inclusive of materials 12,300=0.41c

"Freight to Millbrae 5,000=0.17c

"Labor, teaming and board in connection with laying and handling and hauling the pipe on the ground. 56,000=1.86c

"Total\$326,800=10.87c

"This work having been done mostly in 1903, when the conditions of prices and labor and the length of the days' work were as they are now, gives us the best criterion that we have of the exact cost for the whole, or the cost per pound of similar work." (pp. 1203-1207.)

* * * * *

"Whenever a pipe is laid and completed, the first thing is to test it thoroughly. We slowly turn in the water, and we let the full pressure stand in this pipe sometimes for a month or two, for the purpose of absolutely taking away the asphaltum taste from the water. We blow off the pipe and fill it again, and blow it off again, and keep a current through this pipe until the taste of the

Footnote, continued.

asphaltum has entirely disappeared, and then we turn it into use. We always allow a reasonable length of time for that purpose between the immediate time that it is completed and before it goes into use.

"This total cost of 10.87 cents per pound is somewhat higher than our average has been and would be, even under the present circumstances. We have had pipes that run up to about 10.4 cents per pound, whereas this is 10.87 cents, and even in that pipe the iron happened to be bought at a time when the market was depressed in the East, and the extreme high grade of iron that we are using—this first-class iron we used in the 54-inch pipe—was not obtainable, consequently we had to be contented with a somewhat less grade of iron; but owing to the fact that the labor of laying the pipes was under more difficult circumstances, requiring a greater expenditure of labor per pound of iron in the laying of the pipe, the total nearly balanced itself, so that the total of the pipe was about 10.4 cents a pound, whereas the pipe I am now speaking of was 10.87 cents a pound. We cannot always expect to hit the market at the lowest stage, and, secondly, we shall always try to get the high-grade material we have adopted for the bulk of the San Andres pipe line, as well as for the Crystal Springs 44-inch pipe line and the Alameda Creek 36-inch pipe line, and particularly for the 54-inch new Alameda pipe line. So that, striking an average between this 10.4 cents a pound of the lower price and 10.87 cents a pound of the higher price, it makes an average of about 10.63 cents a pound, and, as the circumstances of laying the pipe are generally about the same, except that with the greater distance from the manufacturing center the cost of transportation increases over and above the small cost of transportation that I have counted in here, where it was only brought to the neighborhood of Millbrae, with a short haul, the standard figure of 10.6 cents a pound has been the general result of our experience, and that exhibits the cost, exclusive of 10 per cent for incidentals and contingents—engineering and superintending expenses—per pound of plate iron manufactured into pipe, and laid in that first-class manner which I class at fully as high grade as the best boiler work in the ditch, and complete in the ground, with all the asphaltum coating and the material and the ground replaced in as near the same manner as we found it. The 10 per cent for sundries and incidentals that I have allowed on this pipe, and in the case of the 54-inch pipe, does not quite cover the incidentals, but I did not want to vary from the standard of the other. The total cost of the Alameda pipe, with all incidentals, runs somewhat higher than the figure I have given of 10.87 plus 10 per cent. These incidentals include cement for the pipe saddles at about every ten feet, steel bridges and concrete bridge piers, and the rock and sand hauled for the same, lumber for timbering up the ditch, paraffine paint and asphaltum for painting the pipe in the ditch; plows, scrapers,

It must be apparent that the figures given by Mr. Duryea are based on so incomplete investigations and on water rights and property the title to which is in so indefinite shape as to make them absolutely valueless for purposes of legal conclusions.

The other two witnesses for defendant, to-wit: Mr. J. H. Dockweiler and Mr. C. E. Grunsky, ex-city engineer, furnished defendant's main case. The testimony of Mr. Wenzelburger, as an expert, did not in any practical manner affect the general principles.

(c) *J. H. Dockweiler.*

The first four pages of Mr. Dockweiler's testimony are devoted to an attempt to qualify as an engineering expert by setting forth in detail the amount of work done by him as a subordinate to other engineers on comparatively unimportant work, and the number of appraisements made by him—in most cases for unfinished work. His testimony was based mainly on tabulations made by hearsay from unverified reports obtained from correspondents in various towns and cities of the United States. It makes no difference to him whether the

Footnote, continued.

powder, fuse, I-beams—I have mentioned them—lumber for bridges, picks, shovels, blacksmith tools, hardware, pumping engineering, surveying and other incidentals. As I have testified before, the 10 per cent that we have allowed on our works in these estimates is not quite enough, but it being customary and having been customary in my estimates to allow 10 per cent, I have adopted the same schedule here, although in most works nowadays as high as one-seventh is added, as, for instance, in the estimates that were made for a new city sewer system, there is 14 per cent added, which is practically one-seventh of the estimated cost, because there are always unforeseen and unknown expenses coming in, and the 10 per cent is not quite a sufficient allowance for it." (pp. 1207-1210.)

cities are hilly or flat, near rivers of large size with a constant flow, requiring no storage nor distributing reservoirs, or far distant from such sources of supply; whether in territory where there is a practically continuous rainfall the year round, or an intermittent rainfall with six to eight months of drought; whether the watersheds from which the water is obtained are easily protected from contamination, or whether they are within the zone of human activity; whether the figures are given to represent the amount of water furnished to the entire city's population, which figures are used to obtain the percentage, or only a portion thereof; or whether the figures taken, use the cost of a municipal supply without considering interest on bonds paid out, or contributions from general taxes to make up deficits in water funds; all this information is jumbled together and the data taken for any and all purposes. The witness himself shows the absolute lack of value of his tabulation, when, after introducing his table showing per capita use in other cities, he says: (p. 514)

"That it would be manifestly unfair to judge a water rate on the pure statement of the per capita, when only a certain portion of the population is supplied."

We would respectfully submit that it is highly unfair to test a water rate on any basis named by this witness.

Again, after compiling statistics from various cities with reference to their bonded debts, he testified:

"The bonded debt of Philadelphia is \$19,159,300, or 51.8 per cent of the cost of construction. Chicago has only 9.7 per cent bonded debt of the total cost of its works. I give these percentages for this reason, *that it is unfair to compare any work that had to pay*

interest on its entire debt with a works that is paying interest on a very small percentage, or in some cases no percentage at all." (Defendant's tes. p. 532.)

The field of uncertain conjecture into which this witness' imagination runs is illustrated by the following: (p. 534)

Q. 86. "Assuming that the rate of interest at which San Francisco *issues* her municipal bonds is $3\frac{1}{2}$ per cent, and from your table there that the interest paid by the majority of cities outside of San Francisco is more than $3\frac{1}{2}$ per cent, should not that fact be taken into consideration in making an estimate of what water would cost to San Francisco under municipal ownership?

A. "Taking that into consideration and making a comparison, you could expect rates to be, under municipal ownership, lower than they would be under private ownership, the low rate of interest at which you could sell your bonds affecting that determination."

The ludicrous character of this evidence is apparent when it is known that none of San Francisco's $3\frac{1}{2}$ per cent bonds have been *sold* except to local people for special private reasons arising out of public spirit not due to desire for an adequate financial return.

Contrast the conclusions of this witness with those of Professor Plehn, in his article on interest, which was introduced in the testimony of the witness Dockweiler, as follows: (page 613)

Q. "Have *you* made any investigations into the questions of the rates of interest prevailing in San Francisco?

A. "*I* have. Professor CARL C. PLEHN has the following to say:"

What Professor Plehn did say is this:

"Every economist discovers sooner or later, that among the data which he most frequently requires for use in his work, few are harder to obtain than the average rates of interest. To be sure the daily papers and the financial journals give us the asking or published rates of interest in different cities for several different kinds of loans. *But such statements do not prove of much use for scientific purposes.* They are usually in a very good form, purporting to give the highest and lowest rates, and they give us no clue to the amounts loaned at each of the different rates. Hence it is not possible to ascertain the average."

We are quite prepared to say that the witness has tabulated everything concerning water supply and rates in other cities, but the question is what is the value of his figures for purposes of comparison? He has taken, for instance, the city of Sacramento, whose surface is level, whose water supply is on a river always containing water sufficient for the city, whose water is pumped, with no reservoirs for distributing and no need for storage reservoirs, and compared that city with San Francisco requiring nine distributing reservoirs of an aggregate capacity of 187,145,000 gallons (temporarily omitting from consideration Lake Merced as a reservoir), on hills ranging from 175 feet high to 600 feet high, whose water supply must be stored for at least three years in advance, requiring reservoir capacity for 29,000,000,000 gallons, whose distributing plant requires 400 miles of pipe, where the supply itself is subject to droughts sometimes of such character as to occasionally deplete the stock on hand rather than to increase it. In another instance he compares us with

the city of Buffalo, which gets its water from the Niagara River (an unceasing source) by pumping direct. That city uses 319 gallons per capita and there is never any question about possibility of drought (p. 526). Again, he compares us with Boston, where the water works have been practically established a half century in advance of the growth of the city, and the city buys its water from another quasi-municipal corporation, wholesale, and owns nothing more than its distributing plant.

In attempting to determine whether engineering works of like character generally exceeded the estimate, he introduced (p. 586) an unverified personal letter from a major in the U. S. Corps of Engineers, in which the major says:

"It is believed that these (instances) indicated tend to show that, if improvements were undertaken promptly and funds provided for prosecution without interruption and delays, and there is no great and unexpected increase in cost of labor and material, there is no good reason why in most cases the works should not be carried to completion well within the estimates."

Of all conjecture upon conjecture which has ever been brought to the writer's attention, this is the most glaring exhibition. Remembering that the new city hall in San Francisco was estimated to be built in five years at a cost of three million dollars, and took fifteen years and cost \$13,000,000, and having in mind the fact that the Panama Canal scheme has not yet reached a condition where the government has determined whether or not it shall be a tide level canal or one with a series of locks of various levels, and realizing that the

Tuolumne project will require at least five years to build according to Mr. Grunsky's highly optimistic estimate (p. 386), and from eight to ten years according to Mr. Adams (p. 4674) and that city bonds to build Tuolumne must be issued and sold in advance in order to obtain money enough to carry on the work, and that at least two political campaigns will intervene between the commencement and the finishing of the work, there is little hope that the work can be carried on "without interruption or delays" or that there will not be "great or unexpected increase in cost of labor?"

Referring to the various large works which were delayed (page 587), Mr. Dockweiler says: "There were also serious political disturbances and many charges were made against the commissioners for the way they carried out this work." And on the question of Mr. Kellogg: "In what sense do you use the word 'political' in your observations there?" he answered: "Conditions relative to government, relative to the men in charge of the works, the men whom they hire, and all the various and thousand and one things of commission and omission." (p. 587.)

Where is there any hope from past experience that a fifty-million dollar project in California, requiring five to ten years to build, would be free from political disturbances and charges against commissioners?

Experience has taught us that seldom is public work completed on time, or for the original estimated price. On this point Mr. Adams testified: (p. 5308)

"It is a general rule that the actual cost of engineering work of large character exceeds the estimates, and

unless the engineer in preparing his estimates bears this fact constantly in mind such a result is almost certain to follow. By way of illustration, I will give you the published cost of a considerable number of important engineering works in the United States, and the amount of the original estimates,—also the ratio between the engineers' estimates and the actual cost:

TABLE SHOWING PERCENTAGE INCREASE OF ACTUAL
COST OF PUBLIC STRUCTURES OVER
ENGINEERS' ESTIMATES.

	Engineer's Estimate.	Actual cost.	Ratio.
Erie Canal (1st).....	\$ 4,926,738	\$ 7,143,789	1 to 1.45
Erie Canal (first enlargement)....	23,402,863	32,008,851	1 to 1.37
Erie Canal (second enlargement).. (After expending \$9,000,000, the work was less than one-half, some believe but one-third, completed.)	12,000,000		
Black River Canal	1,068,437	3,157,296	1 to 2.95
Hoosac Tunnel	1,948,557	10,000,000	1 to 5.1
Manchester Ship Canal	26,000,000	67,351,105	1 to 2.6
New Croton Dam	4,150,573		
(To complete the structure, it was estimated by the Chief En- gineer in 1904, that a total ex- penditure of would be required.)		6,400,000	1 to 1.54
Oswego Canal	227,000	565,437	1 to 2.5
Oswego Canal (first enlargement)	1,926,339	2,511,992	1 to 1.3
Champlain Canal	871,000	1,746,062	1 to 2
Chicago Drainage Canal	12,000,000		
After expending \$27,303,216, it was estimated that an addition of \$10,358,436 would be needed to complete it, or a total of.....		37,671,653	1 to 3.14
Hudson River Improvements	2,000,000		
After expending this amount, it was estimated that \$2,600,000 ad- ditional would be required to complete it, making a total of...		4,600,000	1 to 2.3
State Capitol at Albany.....	4,000,000	24,000,000	1 to 6
Cincinnati Southern Railway	10,000,000	18,000,000	1 to 8
Cincinnati Water Works	6,500,000		
In 1904, it was stated by the En- gineers that it would require a total of to complete it.		8,500,000	1 to 3

"I visited these works in Cincinnati in November last, at which time they were still far from completion. I was informed by the engineers in charge of the work that it was expected that two years additional time would be required to complete them and that the final cost would be about \$8,500,000. I have very recently observed through current engineering literature that within the last week it is still expected that two years will be required to finish the work that the total estimate cost is now placed at \$10,000,000. I might also call attention to the great range of estimates for the construction of the Panama Canal. The original estimates of De Lesseps for a sea level canal was \$127,600,000. The Panama Canal Company organized by him actually raised \$246,700,000. The Commission of engineers acting for the United States, have estimated that in addition to the expenditures made by the French companies \$240,000,000 would be required to complete the work as a sea-level canal."

The uselessness of tabulating these various statements, made generally by city clerks and compiled at random by employees, is shown when we analytically consider the only table that directly applies to the question involved, viz: That of the reasonableness of rates shown in Defendant's Exhibit No. 82. The same difficulty is shown here as is referred to in Professor Plehn's testimony. The table is just as far from being useful for scientific purposes as were the data gleaned by that scientist for interest rate studying purposes. There is a column in Exhibit No. 82 marked "Annual charges," but the witness does not show who estimated these charges, upon what basis they were made, whether the person making them had any ulterior motive or not, whether the cities selected are situated in a country presenting the same topographical conditions, whether

the works on which the charges were made were entirely completed or completed in advance of the demands of the city in which they were located, whether the population used as the basis of percentage estimate was all in the territory supplied by water, whether the supplied cities took into consideration the taxes paid to meet interest on bonds used to create funds to build water works, and a thousand other considerations, without accurate knowledge of which no scientific conclusions could be drawn from the tabulated statements.

After it was all done and after all of his tables were introduced, the witness was asked the question:

Q. "Have you any further remarks to make upon the tables of comparisons between San Francisco and other cities, which have been heretofore offered as exhibits in this case?"

To which he answered:

A. "There is no other standard of comparison except the *amount of money reasonably and wisely expended*, both in creating the plant and carrying it on, and *there is no other method of measuring the value of the service*, and consequently the reasonableness of the rates. No two cities present exactly the same problem; both may have the same population, both may draw water rates and each have a reasonable rate. One may have a more densely populated portion with less pipe mileage; one may pump its water higher; one may pay more for fuel; one may have heavier machinery or larger pipes; in fact, an almost infinite number of conditions exist." (p. 567.)

We respectfully submit that he negatives the value of all his own tables at once.

In other words, all of the data laboriously gathered together as to the relative expenditures of the various cities throughout the United States, are valueless except from an academic standpoint, and have no weight in determining the reasonableness of the rate in San Francisco.

Mr. Adams takes such cities as he is familiar with and eliminates the differences of the peculiar conditions arising from payment of taxes by private corporations and the non-payment of taxes by municipal corporations, and the tables take on an entirely different aspect. If he had been familiar with the topographical situation so as to be able to and show how much water was pumped to a 100-foot level in each city, how much water was pumped to a 300-foot level in each city, and how much water was pumped to a 500-foot level in each city, and thereby have been able to have equalized the extra expenditure for lifting water for distributing purposes, he undoubtedly would have had another series of figures. Again, if he had been able to know which of the cities were prepared to take care of future supply for five years in advance, which for ten years in advance, and which for fifty years in advance, he would have had another series of figures. Again, if he had been able to know which of the plants were figured as if the entire population of the city was supplied by such plant, whether this plant distributed to that entire population or only to those who lived in a certain territory (say, for instance, a portion similar to that supplied by the University Mound reservoir alone), or to have known which city had a

population consisting of twenty-five per cent transient and which city had a population of ten per cent transient, or which city had a separate water system for the fire department, and a thousand other things, he would have had a thousand other sets of figures. But the set of figures given by Mr. Adams at page 4762 of his testimony and explained by him at page 4763, proves conclusively that despite the unique difficulties of San Francisco's supply the water rate during the year 1902 was altogether too low, say nothing of the years 1903 and 1904; and the modified figures as given at page 4764 show that the ratio of fourteen cities, the distribution of which is not fraught with the difficulty arising from being compelled to have a two to three years' storage as a precaution against drought, nor from being compelled to maintain nine subsidiary reservoirs, is from nine to ninety-eight per cent more than San Francisco.

The table is as follows: (p. 4764)

(See following page.)

TABLE SHOWING RATES OF FOURTEEN CITIES (WHEN
MODIFIED AS TO TAXES) AS COMPARED
WITH SAN FRANCISCO.

Municipal or Private.	City.	Population in 1900.	Ratio of rates as given.*		Ratio of rates, omitting taxation.	
			Case "A"	Case "B"	Case "A"	Case "B"
M & P	New Orleans	287,000	1.98	1.72	...	...
M	Providence	176,000	1.41	1.28	1.70	1.53
P	Louisville	205,000	1.32	1.02	...	...
P	Memphis	102,000	1.25	1.58	...	...
M	Allegheny	130,000	1.21	1.05	1.45	1.26
M	Fall River	105,000	1.20	1.17	1.43	1.41
M	Portland, Ore.	90,000	1.14	1.65	1.37	1.97
M	Columbus	126,000	1.09	1.03	1.30	1.61
P	Scranton	102,000	1.09	...	...	...
M	Kansas City	164,000	1.03	...	1.24	1.36
P	Denver	134,000	1.03	1.72	...	...
M	Los Angeles	102,000	1.01	...	1.21	1.13
M	Milwaukee	285,000	1.01	...	1.20	1.22
M	Jersey City	206,000	1.00	...	1.20	...

* San Francisco being taken as 1.00. (See table, test., p. 4762.)

This table is explained by Mr. Adams as follows:
(p. 4764)

Q. 276. "Does it indicate the ratio making allowance for taxes, or as the rates are actually paid?"

A. "In this table the comparison as made, in columns 4 and 5, are on the basis of rates as they actually exist in these different cities compared with the rates as they exist in San Francisco. In the two succeeding columns the comparison is made on the basis of rates as they actually exist in the various cities compared with the rate in San Francisco as it would be if there were no taxation. Both propositions are covered in the table given at p. 4764."

No argument can be based upon what is a reasonable rate in San Francisco as compared with other cities,

unless it be also shown that all conditions in these other cities are the same as here;

City of Denver v. Denver Union Water Co., 91 Pac. 918:

"Where the schedule of water rates prevailing in certain cities was based on such radically different classification and methods of computation and such a diversity of uses and services, that it was practically impossible to ascertain an average schedule of rates in the three cities for the same service, the provision in a Water Company's franchise authorizing the city to require the company to fix schedule rates for private consumers equivalent to the average charge prevailing in such cities for the same service, was invalid."

and the peculiar difficulties of supplying the City of San Francisco are clearly set forth by Judge Morrow in his opinion in this very case:

Spring Valley Water Works v. City and County of San Francisco, 124 Fed. Rep., at page 600.

See also:

State v. Minneapolis & St. Louis, 89 Am. St. Rep. 514, at page 524;

And:

Morrell v. Union Pacific Ry. Co., 6 Interstate Commerce Rep. p. 121:

"Rates maintained and which may be reasonable under the conditions existing in one section or part of the country, afford no safe criterion by which to measure reasonable charges in other localities where the expense of operating a road and other conditions affecting transportation, are widely different."

And a very valuable discussion of the reasonableness of rates established for different water companies operating *in the same city* is found in

City of Chicago v. Rogers Park Water Company, 73 N. E. 375, at page 377.

These conclusions as to the value of Mr. Dockweiler's testimony based on compilation, do not apply to Mr. Dockweiler's estimates as to the value of the properties given at pages 644-647 of the transcript, because these latter are given as his opinion as an engineering expert. From that point of view, however, his testimony when compared with the testimony of Mr. Hering, Mr. Stearns, Mr. Adams, Mr. Schuyler and Mr. Grunsky, loses weight, because his testimony like that of Mr. Fitzgerald is based entirely on primal cost as is shown at pages 642-3 of defendant's testimony, as follows:

Q. 188. "What do you consider is the proper method of getting at the value of the works of the Spring Valley Water Company for rate fixing purposes?

A. "The cost."

But as we have already shown, it is an established principle in this State and elsewhere that the true basis of valuation is not cost but the present value of the property used and useful in supplying water; cost being but one of a large number of elements.

This leaves the defendant's case practically dependent upon the testimony of former City Engineer C. E. Grunsky.

(d) *C. E. Grunsky.*

The evidence given by Mr. Grunsky is a defense of the figures made by him while city engineer. But Mr. Grunsky himself omits a number of elements of value, while the board of supervisors afterwards struck out several items of value amounting to \$3,900,000, in 1903, and \$4,000,000 in 1904 which Mr. Grunsky himself had included.

The tabulated statement of values of the various properties furnished by Mr. Grunsky in 1903 to the board of supervisors through the board of public works has been the subject of examination by Judge Morrow. Mr. Grunsky himself admits in his testimony that he placed his value of the Alameda properties at *cost* on the theory that such supply might possibly prove to be not permanently serviceable, and that he omitted other properties in San Mateo and Alameda (including reservoir sites capable of being used for storage in the one case and about to be used as a reservoir in the other), on the theory that they were not being *used* at the time, thus also eliminating \$1,386,050.00 (p. 412), notwithstanding the fact that he admits that the latter two items have all the attributes of property which ordinarily are defined as useful. We will use Mr. Grunsky's figures in a later portion of this brief when we compare the values placed upon the several properties by the several engineers.

IX. MATTERS TO BE CONSIDERED IN VALUATION.

1. INTANGIBLE VALUES.

(a) *Those considered by Mr. Grunsky and rejected by Board of Supervisors.*

A. Franchise.

B. Value as going concern.

(b) *Intangible values not recognized by Mr. Grunsky.*

2. RATE OF RETURN TO BE ALLOWED.

(a) *In general.*

(b) *As affected by exclusiveness of franchise for a time.*

(c) *As affected by hazard and risk of enterprise, skill and depreciation.*

3. WHAT THE PROPERTY COULD BE SOLD FOR.

4. WHAT IT WOULD COST TO REPLACE THE SYSTEM.

5. WHAT REVENUE IT IS CAPABLE OF PRODUCING.

1. INTANGIBLE VALUES.

a. THOSE CONSIDERED BY MR. GRUNSKY AND NOT BY BOARD OF SUPERVISORS.

(A) *Franchise.*

Mr. Grunsky asserts in effect that in estimating the value of the franchises, he considered that such value was lessened because there could be no anticipation (judging apparently from the action of the board of supervisors in the past) that the board would fix rates that would allow a reasonable compensation on the

investment. In other words, the franchise value which should be included by a board of supervisors, acting in a judicial capacity, should be estimated at a lessened value because those judges were presumed to act unfairly instead of fairly in determining what would be an adequate return in complainant's property. For that reason Mr. Grunsky practically cuts in two the franchise value as assessed by the assessor of the City and County of San Francisco on which latter value complainant pays taxes.

These are Mr. Grunsky's words:

"The franchise of the Spring Valley Water Company is conditioned upon the duty of the Board of Supervisors to fix water rates annually. There can be no anticipation of any profits in excess of a reasonable interest rate on the capital necessarily and economically invested. * * * * * *The value of the Water Company's properties cannot be considered apart from the duty of the Supervisors to fix water rates.* In fixing the water rates, the Supervisors are supposed to have before them a statement of the Water Company, showing the amount of money actually expended annually, since commencing business, in the purchase, construction and maintenance, respectively, of the property necessary to carry on its business." (p. 178.)

As a part of his report (containing his appraisal in 1902) to the Board of Supervisors, Mr. Grunsky said:

"The creation or destruction of franchise value lies in the hands of the municipal authorities, because * * * the franchise value is directly dependent upon the earnings. The franchise of the Spring Valley Water Works is not defined by any specific agreement with the city. There is not therefore any definite basis available for the determination of its value. * * * (p. 163.)

"* * * Franchise value cannot, under the circum-

stances, be determined and may vary from year to year with the changes in the water rates. (p. 163.)

"In view of the *uncertainty of adequate returns on investments* made in water works properties and the special risks and responsibilities assumed by the Spring Valley Water Works in establishing and maintaining its works, an allowance of \$2,500,000 for franchise value in the appraisement, which is to serve as a basis for establishing water rates, appears reasonable." (p. 163.)

What are the special risks and responsibilities assumed by the Spring Valley Water Works? None, except those forced upon it by the Constitution of California. But the United States Supreme Court in *Spring Valley Water Works v. Schottler*, 110 U. S. 347, 354, held that this State constitutional provision did not violate the rights given complainant under the Federal constitution upon the sole ground that the Board of Supervisors were bound not to act unfairly; in other words are bound to act in such a way as to produce a *certainty*, not an *uncertainty*, of adequate returns.

In that case the Court said:

"But the officers here selected are the governing board of the municipality, and they are to act in their official capacity as such a board when performing the duty which has been imposed upon them. * * * Such regulations do not deprive a person of his property without due process of law. What may be done if the municipal authorities do not exercise an honest judgment, or if they fix upon a price which is manifestly unreasonable, need not now be considered. * * * Like every other tribunal established by the legislature for such a purpose, their duties are judicial in their nature, and they are bound in morals and in law to exercise an honest judgment as to all matters submitted for their official deter-

mination. It is not to be presumed that they will act otherwise than according to this rule."

If then, Mr. Grunsky had followed this rule, and had "presumed" that there were no special risks or responsibilities assumed by the Spring Valley Water Works, and if he *had* also assumed that there *was a certainty* of adequate returns, then he would not have considered the franchise which the Assessor appraised at \$5,300,000 in 1903 (Municipal Reports 1904-5, p. 500), at less than that amount. If this value of the franchise be added to the tangible value of the property established by Mr. Grunsky, to-wit: \$24,124,389 (p. 171), we will then have the valuation of the City Engineer, exclusive of value of going business at \$29,424,389.

The learned engineer himself, in an attempt to help out the Board of Supervisors, recommends the taking of certain of the company's property without due compensation. At page 177 he testified:

"I could find no basis for a franchise value. Franchise value depends upon anticipated future profits. If these anticipated profits exceed an amount which would yield a reasonable interest allowance on the investment, the excess may be considered as representing earnings on value not covered by the capital actually invested. This excess value, when it exists, may be considered franchise value and value of the going concern. Such value is usually indefinite and uncertain."

Apparently he considers that because such values are "indefinite and uncertain" they should be *eliminated* altogether, losing sight of the fact that by so doing, he eliminates between \$2,500,000 and \$5,000,000 from the value of complainant's property.

Mr. Grunsky continued:

"Future earnings cannot always be ascertained with precision, and profits generally are even more uncertain than the earnings. It is only when a contract or agreement has been entered into fixing a rate to be charged for the service rendered, and fixing the time during which the rate is to be maintained, that data become available for estimating these intangible values. With all the elements of the cost of rendering the service, and revenue, with all conditions affecting the same taken into account, it becomes possible to capitalize profits and to ascertain such values as a franchise value with more or less precision; *but it is very different when there is no contract and no guaranteed rate at which the service rendered will be paid for.* The franchise of the Spring Valley Water Company is conditioned upon the duty of the Board of Supervisors to fix water rates annually. There can be no anticipation of any profits in excess of a reasonable interest rate on the capital necessarily and economically invested." (pp. 177-178.)

If he be correct, and "there can be no anticipation of any profits in excess of a reasonable interest rate on the capital *necessarily and economically invested*," then we must assume that there can be no anticipation of an honest valuation of the property except such portion thereof as is represented by "capital necessarily and economically invested" to-wit—primal cost; and the law says that the rate is to be upon present value of the property actually used and useful to the appropriation and furnishing of the water.

Much of this property may have been obtained by complainant on the basis of value as outlying farming land, not of water property. Much of the property may have been developed subsequent to the time of its purchase through skill and comparatively little capital

invested, but, nevertheless, it is the property of complainant, and it is being used and is useful in furnishing water. To eliminate those elements and to allow no profit on them, is to assume what the Schottler case says we cannot assume, viz: that the Board of Supervisors are not honestly taking into consideration the value of all properties used and useful. The learned engineer's difficulty in finding a definite value for the franchise is due to the acts of the Supervisors themselves. If they will exercise the rate-fixing power judicially and fairly as the U. S. Supreme Court says they are bound to exercise it, the law reads into the franchise of the complainant the same element of stability as the learned engineer finds in a contract or agreement which has been entered into between private parties. If the learned engineer and the Board of Supervisors would act as the Schottler case says they are presumed to act, and fix upon *all* the properties a rate reasonable to this class of enterprise, there would be a sufficient revenue to show this franchise to be as valuable as it is and ought to be.

The indefiniteness and uncertainty mentioned by the learned engineer arise *entirely* because of the refusal of the Board of Supervisors to follow the law as laid down in the constitution and statutes of California and to act, as the Schottler decision says they are presumed to act.

Franchise valuation was recently allowed in the amount of \$20,000,000.00.

Consolidated Gas Co. v. City of New York,
U. S. Circuit Court Southern Dist. of N. Y.

That franchise valuation is proper element is found in the following cases:

Kennebec Water Dist. v. Waterville, 54 Atl. 11-20;
Town of Bristol v. Bristol, 49 Atl. 974.

Also by Judge Morrow in decision on preliminary injunction in this case:

Spring Valley v. San Francisco, 124 Fed. 587-594.

(B.) *Value as Going Concern.*

In this same report to the Board of Supervisors (p. 163) Mr. Grunsky stated:

"The value due to the fact that the Company has an established business, results in part from the numerous connections that have been made at large aggregate expense of the distributing system with the house pipes of consumers. It seems reasonable to assume that a water company thus established, without competitors of note, should be entitled to an allowance, in the appraisement of its properties for rate-fixing purposes, of about 25 per cent of the valuation of its city distributing system."

The report further says, that the value due to the fact that the Company has an established business, results from many things therein enumerated, and places it at \$1,400,000.00.

The Board of Supervisors subsequently eliminated the latter figure from his valuation upon which the 1903 rate was based, but Mr. Grunsky, in his testimony, p. 177, further explains this item as follows:

Q. "In appraising the lands owned by the Spring Valley Water Works, did you make that appraisement

based on values as they prevailed at the time you filed your report?"

A. "That is substantially the case. This valuation, being based upon land values at a date subsequent to their acquisition, is undoubtedly in excess of the actual cost of acquiring these lands. * * * The appraisalment contains an item to which I desire to call special attention: Value due to the fact that the business is an established one, \$1,400,000. This amount, as well as the excess of land and water right appraisalment over actual cost, is substantially an allowance for contingencies, omissions and the like."

In other words, after Mr. Grunsky had estimated the tangible properties, he realized that these tangible properties had elements of value which though existing, could not be seen and he made an allowance therefor.

Again, when Mr. Grunsky undertook a general discussion of the relative values of the various water supplies possible for San Francisco, he said, in discussing the value of the Spring Valley Water Works:

"In the first place, the works have the advantage of being already constructed and in actual use. * * * Their distributing system, which with its 400 miles of pipe, reaches every important establishment in the city, and from which some 50,000 private services are supplied, will either come into use with any other project, or it must be practically duplicated in case that it be not made part of the municipal system." (p. 306.)

It is evident that it is impossible to estimate the value of the Spring Valley Water Works' properties as compared with that of any other properties, without taking these last quoted elements into consideration and giving them value. Taking into consideration that these properties are worth somewhere between \$25,000,000

and \$70,000,000, and that from \$6,000,000 to \$9,000,000 thereof is in the distributing plant, the additional valuation over the cost of the city distributing system of \$1,400,000 is small for this item.

That element of going concern is proper is shown in the following cases, viz:

Brunswick Water Dist. v. Maine Water Co.,
59 Atl. 459-539;

Long Branch Co. v. Tintern Manor, 62 Atl.
474-478;

Spring Valley W. W. v. San Francisco, 124 Fed.
587-595;

Gloucester Supply Co. v. Gloucester, 60 N.
E. 977-982;

Kennebec v. Waterville, 54 Atl. 11-19;

Galena Water Co. v. Galena, 87 Pac. 736-7;

Cumberland Tel. & T. Co. v. R. R. Com.,
156 Atl. 828-833;

Town of Bristol v. Bristol, 49 Atl. 974.

As is shown in the Kansas City case the *mere cost of reproducing the water works plant is not a fair test*,

“because that does not take into account the value which flows from the established connections between the pipes and the buildings of the city. It is obvious that the mere cost of purchasing the land, constructing the buildings, putting in the machinery, and laying the pipes in the streets—in other words, the cost of reproduction—does not give the value of the property as it is to-day.

“A completed system of water works, such as the company has, without a single connection between the pipes in the streets and the buildings of the city, *would be a property of much less value than that system connected, as it is, with so many buildings, and earning in*

consequence thereof, the money which it does earn. The fact that it is a system in operation, not only with a capacity to supply the city, but actually supplying many buildings in the city,—not only with a capacity to earn, but actually earning,—makes it true that ‘the fair and equitable value’ is something in excess of the cost of reproduction.

“The fact that the company does not own the connections between the pipes in the streets and the buildings—such connections being the property of the individual property-owners—does not militate against the proposition last stated, for who would care to buy, or at least give a large price for, a waterworks system without a single connection between the pipes in the streets and the buildings adjacent. Such a system would be a dead structure, rather than a living and going business.

“The additional value created by the fact of many connections with buildings, with actual supply and actual earnings, is not represented by the mere cost of making such connections. *Such connections are not compulsory, but depend upon the will of the property-owners, and are secured only by efforts on the part of the owners of the water works, and inducements held out therefor.* The city, by this purchase, steps into possession of a waterworks plant,—not merely a completed system for bringing water to the city and distributing it through pipes placed in the streets, but a system already earning a large income by virtue of having secured connections between the pipes in the streets and a multitude of private buildings. *It steps into possession of a property which not only has the ability to earn, but is in fact earning. It should pay therefor not merely the value of a system which might be made to earn, but that of a system which does earn.*”

National Water Works Co. v. Kansas City, 62
Fed. p. 853, 865.

"The construction cost is admissible, but not controlling on the question of present value."

Kennebec Water District v. City of Waterville,
54 Atl. Rep. 7-18;

State v. Minneapolis & St. L. R. R., 83 N. W.
60.

(b) INTANGIBLE VALUES NOT RECOGNIZED BY
MR. GRUNSKY.

Elements of value through skill in development and in proving the property capable of overcoming latent defects known to be possible at the time of purchase in days before need was apparent to anyone but complainant's experts are now recognized in law. A concrete example will show one such element in complainant's property.

Many decades past the chief engineer of the company was convinced from comparatively incomplete observation that many million gallons of water a day which flowed from the extensive watershed of Alameda Creek, was disappearing in the gravel bed below, along the Creek.

The supply of water when stored and conducted to certain gravel beds, which complainant was satisfied could be made to act as a natural filter, would apparently represent over fifty million gallons a day. But this could not be determined without a series of very careful experiments. To commence to make these experiments would be to immediately announce to the various property owners that the Spring Valley was going to purchase their property for water purposes, and therefore

land which was being held at figures of from \$50.00 to \$100.00 an acre for agricultural purposes, would be immediately raised in price to from \$100.00 to \$1000.00 an acre for water works purposes. The Water Company expended over \$3,000,000 in acquiring this watershed, and then, and not till then it began to make experiments in the gravel bed. This delay was not because of lack of business foresight, but rather in the exercise of prudence, for the reason that if these experiments, made under the observation of the general public and adjacent land owners, were successful, the price of the land would have so increased that there would have been no possibility of purchasing the property at less than from 20 to 30 million dollars—a practically prohibitive figure. A cement dam was erected across the mouth of Alameda Creek. (p. 1106.) Thereupon the water level in the gravel raised, and this watershed was made to produce, and is now producing, crystal pure water to within about twenty per cent of the peninsula system with its 26,000 million gallon reservoir capacity.

The experiment was a success! Thereupon a concrete receiving filter gallery about a mile in length was built under and through the filter bed, to collect this water for San Francisco. From this gravel bed San Francisco to-day gets an average of about 15,000,000 gallons per day of pure, filtered water, taking the average for the whole year.

Now, suppose the experiments had been unsuccessful! Suppose this engineer had not correctly solved the problem!! Then this water would have had to have

been husbanded in the same manner as was the water on the peninsula, by a surface dam and auxiliary structures costing \$2,000,000 to \$3,000,000. The Board of Supervisors of San Francisco would gladly have paid interest on the money invested in these properties above ground, because they could see the investment, but the supply of water would have been inferior in quality.

All these experiments and plans, after they became active, took from three to five years to accomplish. The land was bought 10 to 20 years before.

Shall this skill and pioneering risk not be estimated in determining values?

By use of the three additional dams to impound water in three additional creeks adjacent to this gravel bed at a cost of about \$5,000,000, for reservoirs, and \$7,000,000 for conduits and the like, water can be made available for San Francisco through this gravel filter to increase the production of the Alameda properties by 70,000,000 gallons of water a day. (Stearns p. 4402.) This will be sufficient to take care of San Francisco when its population is three quarters of a million, and this water will be drawn from land owned wholly and solely by the complainant company, from which it has eliminated all possibility of contamination from human activities by the removal of houses, dairy farms and hog ranches. From 10 to 50 years in advance of its use, the company has demonstrated the value of the property and dedicated it to the future of San Francisco. These investments, however, are not taken into consideration by the Board of Supervisors, because not considered used or useful.

Similar property, to-wit, the Crystal Springs dam, with contributory watershed, were considered in 1903. Thirty years ago these properties were in the same condition as to incompleteness as was the Alameda property in 1902. Prior to the building of the lower Crystal Springs dam, there was grave doubt as to its feasibility. No concrete dam of that size had been built at that time. The money then being invested in it was withheld from revenue producing for from two to five years.

Shall this property, which 30 years ago was in the same dedicated, but partially used condition as the Alameda property was in 1902, be now compensated for at a less rate than the bonds of a traction company which is paying interest at five and six per cent immediately upon the money being invested? To figure our return from this class of properties, considering the business hazard at less than seven per cent, the legal rate of interest, is a wrong.

The city engineer of San Francisco in November of 1902, said: (p. 309-10 of testimony)

"The further development of the resources of the Sunol Valley and adjacent territory includes the construction of storage reservoir on San Antonio Creek and the construction of what might be called a temporary reservoir in Calaveras Valley. Water from these, liberated during the low water period of the creeks, will be delivered to and be filtered by the natural gravel beds of Sunol Valley, equalizing the output of this source. The permanent value of the natural filter remains to be demonstrated. The water reaching the galleries travels a greater or less distance through the gravel. It is freed from suspended impurities. Some of the water taken from the creek is in contact with the

gravel but a short distance, sinking almost vertically to the intercepting conduit. To what extent is this filter system efficient, and will continued use clog the gravels or otherwise render the filter inefficient as a purifier of the water, are questions which can only be answered on the basis of long continued systematic observation under earnest co-operation of the Spring Valley Water Works."

It is inequitable that properties such as these only made valuable after being tied up without revenue for several years and proven as to their value, as indicated by the City Engineer, should be allowed only the same percentage of income as properties where the money invested is certain to produce return immediately.

Again, Mr. Grunsky (at page 315), while discussing the Tuolumne River project, says:

"It may be noted that on the basis of a city supply of about 50 to 60 million gallons of water per day, the first cost of works, purchase and completion, would be about as follows:

Spring Valley Water Works (including	
the Calaveras Valley project) . . .	\$37,000,000 00
* * * * *	
Tuolumne River	39,531,000 00

The completion of the Calaveras Valley sub-system of the Spring Valley Water Works, is assumed for the purposes of this comparison only. For this comparison the appraisement of value of the Spring Valley Water Works' properties, submitted to the supervisors for consideration in fixing water rates, has been used, and the estimate of the water company's engineer for the utilization of the Calaveras properties, \$10,677,000.00, has been added * * *. That the Spring Valley Water Works' system, to the extent of its capacity, ranks first in the reliability of service; that the Tuolumne River project ranks highest in the quality and

quantity of water. That in the matter of first cost to the city the advantage should be in favor of the Spring Valley system."

In other words, because the Spring Valley system has been tried and found efficient, because of its great reliability of service, this learned engineer gives it higher rank than his pet project of the Tuolumne River.

It certainly should be recompensed for this tested excellence in some way.

This evidence is valuable for another purpose. Mr. Grunsky estimates the tangible properties of his Tuolumne River scheme at \$39,531,000.00 (p. 280). He estimates the physical properties of complainant at \$24,124,389.00 (p. 175). If he is in error in one, he may be in error in the other. There should be every reason why he, as a conscientious engineer, should give the benefit of whatever doubt there was in his mind, to the people whom he represents, exactly as there is every reason why Mr. Schussler, the chief engineer of the company, as a conscientious man, should give the benefit of every reasonable doubt in his mind to the people he represents, the Water Company. But Mr. Rudolph Hering, the eminent New York engineer, whose place in his profession is so firmly established that there should be no reason why he should allow his judgment to be biased either way, and who has no employment that would require him to give the benefit of doubts either way, gives as the cost of the Tuolumne scheme, \$55,000,000.00. In other words, he adds practically forty per cent to Mr. Grunsky's

figures. Similarly, he estimates the Spring Valley property as a minimum, at \$45,000,000.00, an increase over Mr. Grunsky's figures in 1903, of \$28,000,000.00 (including the value of the going business), or about fifty per cent. Mr. Stearns revises Mr. Grunsky's first cost of the Tuolumne project, with two pipes, and makes it \$54,000,000.00, practically Mr. Hering's figures. He considers the Spring Valley system more valuable than the Tuolumne system, and therefore values the Spring Valley system as equal to a 3-pipe Tuolumne system costing \$70,000,000.00. On tangible values alone, we find that Mr. Grunsky differs from the other engineers on his Tuolumne project by forty to fifty per cent.

The intangible values due (a) to skill in developing water, and the distribution thereof, (b) due to eliminating all possibilities of law suits concerning water rights by purchase in advance of use—the right from all lower riparian owners closer down to tidewater, and by the use of the water for over five years (the prescriptive period), (c) due to eliminating doubt of potential trouble incident to pioneering risk by proving the system superior thereto, (d) due to establishing the continuity of supply despite of possible accident and temporary shutting off of one supply for purposes of repair or the like by means of an interconnecting system, with other supplies, that makes all parts mutually self-assisting in a unified whole, (e) due to eliminating the necessity and cost of efforts to purchase more property capable of developing water because of the known and proven capacity for producing additional water

sufficient for 40 to 50 years in the future on complainant's own property,—due to the skillful overcoming of expected pioneering difficulties—these will only be mentioned here to call the Court's attention to their existence. The method of valuation thereof will be discussed hereinafter.

The mere difficulty of the fixing of intangible value does not warrant the Board of Supervisors sitting as a judicial body, without any possibility of review, to refuse entirely to give it *any* value and to eliminate it entirely.

2. RATE OF RETURN TO BE ALLOWED.

- a. In general;
- b. As affected by exclusiveness of franchise for a time;
- c. As affected by the hazard and risk of the enterprise, skill and depreciation.

a. *In General.*

The proper revenue is equal to the proper value multiplied by the proper rate; but the proper value has for one of its elements franchise value, and the franchise value varies as the rate to a certain extent. For that reason, the proper rate enters into each of the elements of a proper revenue and is a very important factor in the discussion of proper revenue.

The complainant is in the power of the Board of Supervisors, to an extent greater than is usual with other public service corporations; the acts of the board are fraught with a reflex as well as a direct effect upon values; there is no appeal from the acts of the board,

and no means of reviewing its acts, and no means of forcing the board to consider testimony, however proper it may be.

The very weakness of our position is its strength. Judge Van Fleet has aptly said, in the San Diego case, the courts do not sit "as appellate tribunals to review the correctness of council's determination," but the courts of equity do sit to prevent wrong.

"The protection of liberty and of property are amongst the principal objects for which free government amongst men has been established. * * * Due process of law is denied when any particular person of a class or of the community are singled out for the imposition of restraints or burdens not imposed upon and to be borne by all of the class, or by the community at large."

State v. Ashbrook, 77 Am. St. Rep. 765, 776.

The Federal Supreme Court of the United States in the Schottler case has held that the California Constitution does not take away complainant's property without due process of law, because the compensation for the taking is provided for by acts of a Board of Supervisors who are *presumed* to exercise an honest judgment. The California Supreme Court in the San Diego case has said, that the only matter the courts will decide is whether or not this judgment has been used honestly and in a reasonably just and fair manner.

The constitution having allowed the use of our property to be taken without our consent, having established a tribunal representing our own customers, chosen by our own customers, and being themselves partly our own customers, and the courts having confined all in-

quiry as to the manner in which that tribunal shall act to two elements, viz: to the exercise of honesty and the use of a fair and reasonable discretion, courts of equity should, and no doubt will protect the complainant against the exercise of arbitrary power and require that all elements of value be taken into consideration in fixing water rates, giving the benefit of any doubt to the corporation whose properties are thus bound up and whose hope for appropriate return from its investment is thus circumscribed. When the government requires that this property shall be thus circumscribed in its handling, it is certainly just that the rate of return upon the money thus invested should be greater than the rate of return on a similar amount of money invested in enterprises where the rate of return is dependent upon contractual rights only and where the investor has the right to take advantage of local circumstances for the purpose of increasing the revenue.

This thought has been expressed in another way by Judge Brewer in a celebrated railroad rate case:

"Is there not an element of equity which puts the reduction of rates in a different attitude from the absolute taking of the property by virtue of eminent domain? In the latter case while only the value is paid, yet that value *is actually paid*, and the owners may reinvest and take the chances of gain elsewhere; whereas if the property is not taken the owners have no other recourse than to receive the sum which the property they must continue to own will earn under the reduced rates. Considerations such as these compel me to say that I think there is no hard and fast test which can be laid down to determine in all cases whether the rates prescribed by the legislature are just and reasonable and that often many factors enter into the determination

of the problem. Obviously, however, the effect of the reduction upon the earnings is the first and principal matter to be considered."

Ames v. Union Pac. Ry. Co., 64 Fed. 165, 178.

Judge Morrow, when issuing the temporary injunction, being desirous of ascertaining whether on its face the ordinance of 1903 would act as a taking of complainant's property without just compensation, in order to be entirely safe, took for the purposes of preliminary estimate, five per cent as the net compensation to be received by complainant on the value of its property. This rate, we feel quite satisfied, must from the evidence be considered as entirely too low for the class of properties in question.

b. *Rate of Return as Affected by Exclusiveness of Franchise for a Time.*

Mr. Grunsky testified (p. 346) quoting from his municipal reports:

"The creation or destruction of franchise value lies in the hands of the municipal authorities, because the earning power necessarily depends upon the rates fixed and franchise value is directly dependent upon the earnings. The franchise of the Spring Valley Water Works is not defined by any specific agreement with the city. There is not, therefore, any definite basis available for the determination of its value."

But the Schottler case holds that we must assume that the Board of Supervisors will exercise "an honest judgment as to all matters submitted for their official determination." The Board of Supervisors, of course, are presumed to have investigated the time which would

have been required for some other person to duplicate the plant of the Spring Valley Water Works to make them competitors in the exercise of the franchise right granted by the constitution, not TO CREATE a franchise by giving us what the law gives us but TO RECOGNIZE the existence of the franchise.

The franchise which the Spring Valley Water Works had in 1903 was and will be practically exclusive until it has some competitor owning a water supply and distributing system capable of competing with it. Beyond any question, even if any other company owns land available for reservoir sites and sufficient water, it will take them at least five years' time to build a plant capable of making distribution. Mr. Schussler, Mr. Schuyler, Mr. Stearns and Mr. Adams testified eight to ten years. During that time at the very least, the Spring Valley Water Works would have an exclusive franchise, and thereafter a franchise in common with its competitors.

This being so (and there being no possibility of a competitor for at least five years, and probably ten), certainly the right to furnish this water and to use this magnificent plant must be worth a great deal of money. The element of doubt as to the time in which this exclusive franchise (exclusive because no other source can overcome the physical difficulties of preparing to deliver water in less than that time) could be enjoyed, is one of the elements which must necessarily enter into the rate to be fixed and must necessarily make the rate larger than that which is allowed for interest on staple bonds and securities; and this rate should certainly be

greater than five per cent. It would be unfair if less than seven per cent; and if seven per cent is allowed upon the present value certainly this franchise is worth more than \$2,500,000.00 and very close to the figure given by the assessor, to wit, \$5,330,000.00, which is practically the mean between the figures given it by experts Hering, \$5,000,000.00 (p. 3472), and Adams, \$5,671,509.00 (p. 4769.)

c. *Interest Rate as Affected by the Hazard and Risk of the Enterprise, Skill and Depreciation.*

Mr. Grunsky testified:

X. Q. 556. Do you believe it is proper to add any percentage in view of the uncertainty of adequate returns and the risks and responsibilities assumed by the Spring Valley Water Works in establishing and maintaining its works?

A. I do in this sense, that some of the properties depreciate in value by going out of use, and that ought to be taken into account.

X. Q. 557. Was that taken into account in any of these allowances (referring to the allowances in the estimate made by Grunsky to the Board of Supervisors) that were made?

A. It should be taken into account in fixing the interest rate that is paid.

X. Q. 558. What is your idea in regard to that, that there should be a larger rate of interest than the current rate?

A. That there should be a larger rate than the interest rate on what would be called safe investments.

Again, Mr. Grunsky considered that the rates should be larger than current rates because this class of property of necessity includes property which is only valuable when used in conjunction with other property. The

value of such property was eliminated by him on the theory that it would hereafter be valued at a higher price by some subsequent Board when the property actually comes into use. Mr. Grunsky's theory in this regard was followed by the Board of Supervisors in making its estimate. And for this reason, in order to give an honest judgment as defined in the Schottler case, there must be added not only a reasonable return for the money actually invested at the time, but a return for the use in the past of money which was invested in properties not capable of being used in any other way until actually used in conjunction with the water works. This will be seen by the evidence of Mr. Grunsky (p. 393) who, after stating it was a desirable thing for the Spring Valley Water Works to develop a capacity of delivery to the extent of 60,000,000 gallons per day, testified:

X. Q. 420. How much would you reduce that quantum of 60,000,000 gallons per day if you applied that principle to a private corporation engaged in the supply of a city instead of applying it to the municipality itself, in reference to the amount it should have on hand by an established system?

A. I would not endeavor to reduce it. I think that that depends upon the individual sources that are available, and the amount of water than can be produced from them, and the order in which they would be added to the established system.

X. Q. 421. That being the case, ought not water producing properties to the extent of 60,000,000 gallons a day, that is to say, the excess over present consumption up to 60,000,000 gallons per day, be allowed to the corporation as a part of its assets upon which it could receive interest?

A. Not necessarily, because as these properties are acquired and come into use, they will be allowed in any valuation placed upon the works, and full justice will be done the company by making the valuation as of the time when they do come into use.

X. Q. 422. The valuation of the property at that date, do you mean, or the cost, *plus interest and taxes*?

A. A reasonable cost plus interest and taxes, would be my preferred way of valuing it.

X. Q. 423. You say that will be done; is it upon the presumption that the Board of Supervisors would do that, that you make this statement?

A. On the presumption that they will allow a reasonable amount as the cost of the works necessary to produce the water.

X. Q. 424. And that nothing should be allowed on it in the interim?

A. There is no necessity for allowing any in the interim if that plan is followed.

Certainly property such as this, where the return from the investment is liable to be withheld by the rate fixing board until water is actually being taken and used from that particular source, on the theory that some subsequent board will make up for the omitted revenue by increased rates when the water is actually used from that source, is entitled to a higher rate of revenue than is current return for investments which produce revenue from the minute of investment. Not only is there great risk in the investment, but there is also great risk that subsequent Boards, which will of course be composed of different individuals, will differ with their predecessors and allow no increase to compensate for withheld returns.

It is not fair to consider the interest return on an ordinary business enterprise reasonably commensurate or proper for an investment with the hazards surrounding complainant's property. Men with money free do not enter into business enterprises that have restrictions on them, unless the rate of interest produces a sufficiently large return to compensate for the risk and the inconvenience.

A man invests in a property for revenue, expecting compensation commensurate with, 1st, inconvenience for parting with his money for the present; 2nd, hazard of losing it entirely. If the revenue be large enough he will take upon himself inconveniences and possibilities of loss, and possibilities of having his money tied up for a considerable length of time. But this class of investments must produce a higher rate than such investments as a man can make whereby the only risk is the inconvenience of not having the money to use.

As Judge Van Fleet says (p. 568) in the San Deigo case:

"But this is not an ordinary business enterprise. Those who engage in it put their property entirely into the hands of the public. Having once embarked it is beyond their power to draw back. They must always be ready to supply the public demand, and must take the risk of any falling off in that demand. They cannot convert their property to any other use, however unprofitable the public use may become. They have expended their money for the benefit of others and subjected it to the control of others. That money has, in effect, been taken by the public; and the public, while refusing to return that money, cannot be heard to say that it no longer has need for all of it."

There is an element of risk here of the principal not being returned without inconvenience and possibly not at all, which is quite unusual to an ordinary business enterprise, and this element of risk must be taken into consideration in determining upon the rate to be allowed on the investment.

The current rate of interest established by the statutes of California, is seven per cent. The concurrence of the testimony of commercial men brought into this case (see affidavits p. 5851 A to K), is that seven per cent is the minimum allowance for properties not readily convertible into coin. The statute of 1885 provides that the rate on county water properties should be established somewhere between six and eighteen per cent, and that the board should take into estimation any and all other facts, circumstances and conditions pertinent thereto to the end and purpose that said rate should be "equal, reasonable and just, both to said persons, companies, associations and corporations and to said inhabitants."

From the testimony of Mr. Grunsky last quoted, it must be apparent that a large amount of money must be constantly invested by complainant in preparing for the future development of the city, for preparing for conflagrations and calamities and general municipal purposes. It appears from the evidence that it will take many years (from five to ten years) before any other sufficient supply of water for San Francisco could possibly be brought into successful operation. During this time certainly Spring Valley must be in position to provide water to the city in case of calamity. It

appears that the expenditure necessary to experiment with possible water lands, to acquire title sufficiently far in advance of their actual use not to cause the holders of the land to put an increased valuation on them because of their necessity to be used for water, requires the use of capital which can not be shown to be invested in properties useful for the furnishing of water until several years thereafter. For these additional reasons, it is not "equal, reasonable and just" to establish the rate on a percentage basis, as if the properties were of a character to be accurately estimated in amount and producing revenue to the extent of a full 100 per cent immediately after the investment is made. The Circuit Court of Wisconsin has said on this subject while discussing percentage return for street railways:

"The final inquiry whether the net earnings shown are in excess of or equal to a just return upon the investment presents no serious difficulty. * * * The interest rate fixed in the bonds issued by the company is five per cent. The rate which prevails in this market * * * is six per cent for real estate mortgages and like securities. * * * Surely a *better rate* must be afforded for the risks of investment than can be obtained on securities of this class in which there is no risk."

Milwaukee E. R. & L. Co. v. City of Milwaukee, 87 Fed. 577, 585-6.

For that reason the rate of income should certainly not be less than the current rate of legal interest.

3. WHAT THE PROPERTY COULD BE SOLD FOR.

Ordinarily, as is shown by Judge Van Fleet in *San Diego Water Company v. San Diego*, 118 Cal. 556,

"the judicial test of market value depends upon the fact that the property in question is marketable at a given price, which, in turn, depends upon the fact that sales of similar property have been and are being made at ascertainable prices." Consequently, of course, the first method is fraught with great difficulty, because there never have been any sales of water works capable of supplying San Francisco with water, and hence there can be no *market price*.

But we can approach this problem, however, by showing (1) that certain of the property owned by complainant is capable of being sold for other purposes and therefore has a market value for those purposes; (2) the value of the remaining properties can be approached by means of their present value for water which would include the value of the distributing and storage systems in San Francisco, and the collecting system outside of San Francisco not forming part of saleable real estate; (3) value of franchise; (4) value of going concern.

This subject is elsewhere discussed fully.

4. WHAT IT WOULD COST TO REPLACE THE SYSTEM.

The difficulty of this problem is also very aptly shown by Judge Van Fleet in *San Diego Water Co. v. San Diego*, 118 Cal. 568.

"The construction of municipal water works is a matter of growth. It is necessary in common prudence on the one hand, to construct the works of such capacity as to satisfy the needs of the growing city, not only at the moment, but within the near future; and on the other hand, not to extend them so much as to cast an

unnecessary burden on the stockholders, or the present consumers. As such works are a necessity to the city, they must keep pace with and to some extent anticipate, its growth. When constructed they stimulate to that extent the progress of the city, and tend, like all conveniences, to lower the general cost of production of all things. It results that at least the first water system in any city occupies the position of a pioneer. At any expense the works must be constructed, and usually no reward can be realized by the constructors until some time has elapsed. In the mean time, as the city grows, in part by reason of this very supply of water, the facility of constructing works of all kinds is increased, and the cost of such construction diminished. It would therefore be highly unjust to permit the consumers to avail themselves of the plea that at the present time similar works could be constructed at a less cost, as a pretext for reducing the rates to be paid for the water."

But happily this particular case presents a possibility not usual for water works, because the city engineer has estimated in detail the cost of bringing a similar supply of water to San Francisco from elsewhere with a report containing very full and complete maps accompanying such estimate, all of which enable all of the engineering experts to give their opinions as to the value of this possible substitute. These several figures will be analyzed and compared hereinafter.

5. WHAT REVENUE IT IS CAPABLE OF PRODUCING.

This is dependent upon two facts: Revenue from private sources by collection from the citizens; revenue from public sources because of fire plugs, park sprinkling, hospitals, jails and other municipal purposes.

This subject is discussed in the final chapter.

X. VALUATIONS OF COMPLAINANT'S PROPERTIES.

This will be discussed under the following heads:

1. Elements of value of Spring Valley properties recognized as existing by the city administration but omitted from values used in adopting ordinances.

2. Valuations graduated to the rate of interest to be allowed as a subsequent compensatory factor.

3. Valuations based on sale price of stock.

4. Values of complainant's property as given by the several engineers with their reasons.

(a) *F. L. Stearns,*

(b) *Rudolph Hering,*

(c) *Herman Schussler,*

(d) *James D. Schuyler,*

(e) *Arthur L. Adams.*

(Including table showing ratio of operating expenses to investment in sixteen cities.)

5. Theory and practice of the city administration as to values. Showing water famine necessary result of practice.

6. What Mr. Grunsky's figures would have been, had he used all elements of value recognized by him;

(Including value of water on hand as check against over-valuation and intangible elements omitted by Mr. Grunsky.)

7. Values from figures of complainant's books as analyzed by Accountant Reynolds.

8. Values based partly on prices which could be obtained, for portions of complainant's properties for other purposes.

9. Table and general analysis of values.

1. ELEMENTS OF VALUE OF SPRING VALLEY PROPERTIES
RECOGNIZED AS EXISTING BY THE CITY ADMIN-
ISTRATION BUT OMITTED FROM VALUES
USED IN ADOPTING ORDINANCES.

Mr. Grunsky's figures which, before being decreased by the two elements "franchise" and "value of going concern," were accepted by the Board of Supervisors to make the rate for 1903, totaled \$28,024,389.00 (p. 182, Grunsky.) They are summarized as follows:

Estimated value of works actually in use.	\$24,124,389.00
Estimated value of established business..	1,400,000.00
Suggested value of franchise about 10%	
of estimated construction.....	2,500,000.00

It will be observed that no elements of value other than those which are inherent in the physical properties are claimed to be included by the Board of Supervisors, and no others are included by Mr. Grunsky, except the value of the established business and the franchise. This value was based upon a purported valuation of detached bodies of land (city and country), of isolated dams and works considered by themselves, of pipes and a general supply of hardware merchandise without considering its value as a unified system capable of performing its functions and capable of

expansion to meet future necessities. And this valuation adopted by the Board of Supervisors (knowing that there was no appeal), was considered a compliance with the law as interpreted in the Schottler case. By this treatment the complainant was necessarily deprived of a portion of its property without compensation.

The learned engineer, who was the inspiration of all the figures used (despite the fact that elements to the amount of \$3,900,000.00 in 1903, and \$4,000,000.00 in 1904, were rejected by the Supervisors) recognized certain elements of value for which he inserted no valuation, viz., he did not consider anything other than those which are "based on an estimate of the cost of reproducing the works and of acquiring the lands and water rights." (p. 158, Grunsky.)

He omitted all elements of value other than cost of properties in which he then knew that money had been actually invested; all increase of such investment occasioned through advance in values or skill in development were omitted. The engineer testified:

"The earnings of the company should be such that the company will receive operating and maintenance expenses, taxes and a reasonable return upon the amount of *money invested*." (p. 179, Grunsky.)

Again, no amount was allowed by the Supervisors or the engineer for depreciation, though the principle was recognized. The engineer testified:

"As the water company should be allowed a reasonable return upon its investment, *depreciation* resulting from deterioration of the plant, or from other causes, should be taken into account in some way." (p. 179, Grunsky.)

Q. 21. Do I understand you to mean by that that in each year the allowance is made upon the actual cost of the work, without writing off anything for depreciation, that that will be fairer to the company than if depreciation were allowed every year?

A. It would in the case of works that have a life sufficiently long. (p. 180, Grunsky.)

Q. 22. Assuming that the life of a water works plant is 40 years, what part of the capital invested should be returned to the water company annually in order that the sums thus paid, at 3 per cent interest, will, at the end of the 40-year period, enable the water company to reproduce the works?

A. The amount that would be necessary to return to the water company would be about one and three-tenths per cent of the capital invested. (p. 180, Grunsky.)

And yet no attempt was made to provide for this depreciation in any way.

Again the engineer testified:

"The Spring Valley Water Works has occupied the most available sites for receiving and service reservoirs, and has an established distributing system." (p. 201, Grunsky.)

and no attempt was made to give any value due to business foresight in obtaining these most available sites.

Again he testified:

"Should a combination with the established system be found advisable, then the main alteration will relate to conduit capacity, as it would, in such event, not be necessary to at once put into service two pipe lines each with a capacity of 30,000,000 gallons per day, a single pipe line would suffice. The pipe line would not terminate in San Francisco, but at Crystal Springs reservoir." (p. 202, Grunsky.)

And yet no additional valuation to the Crystal Springs reservoir and its connections, Pilarcitos, San Andres and Lake Merced, in excess of the actual structural value, was allowed, notwithstanding the fact that their acquirement by the city for use in connection with the Tuolumne project would save the city \$12,524,000.00 (p. 399, Grunsky.)

Again, the learned engineer testified:

“No system of works which is not capable of producing this amount of water (30,000,000 gallons per day) and which is not readily expanded to twice this capacity with possibilities of further expansion, should be regarded as fully adequate to meet this city’s ultimate needs.” (p. 202, Grunsky.)

And yet, notwithstanding the fact that, with great display of engineering skill, with great display of business courage in investment in outside land properties (when money commanded for a time $2\frac{1}{2}\%$ per month) and great display of business foresight in obtaining rights of way and water rights (in some cases separate from the land in which it existed) from reservoir sites through to tide water years in advance of actual necessity so as to be in position to supply at least the required 30,000,000 gallons per day, with possibilities of further expansion, no element of value was allowed for this skill and foresight.

Again he testified:

“As there is no summer rainfall in Coast Range regions near San Francisco Bay to keep up the water supply to the creeks, and no winter snow to equalize the flow of the streams which drain these nearby Coast Range regions, and because these regions are broken

up into many drainage basins of small extent, there are no streams near by of large perennial flow.

"This is particularly true of the peninsula creeks. They are all torrential in character. To make them or the creeks east of the bay available as sources of supply for a large city, it becomes necessary to store their waters in order to equalize their yield.

"When they are to be used for such purpose, it is also necessary to prevent or at least minimize danger of water pollution, because the tributary areas are of a character more or less suitable for human habitation and agricultural and industrial pursuits.

"In the established works, this has been done in part by acquiring watershed areas and controlling the uses to which they are put, in part also by taking advantage of gravel beds to secure a natural filtration of the water." (p. 204, Grunsky.)

And this, taken in connection with the learned engineer's additional testimony:

"The policy should always, under such circumstances, be to compensate the person liberally who by business foresight, judicious investment or perhaps by accident has acquired possession or brought under his control the water which has become a public necessity and which has been made or is to be made a public use." (p. 333, Grunsky.)

It seems almost incredible that the learned engineer allowed nothing for the conceded "business foresight" and "judicious investment" which has enabled the established works to conquer the problem of storing these streams into reservoirs with a total catchment capacity of 28,000 million gallons, equal to a supply for two or three years.

Again he testified:

"The water resources of the Spring Valley Water Works, as now utilized and so far as could be deter-

mined from evidence furnished and data collected, are barely adequate for the immediate needs of the city.

"The system can be made adequate to supply future requirements only by bringing into service additional sources of supply.

"Additional sources of supply claimed are Calaveras Valley, the Searsville system; an increased output from the Sunol Valley gravels; and, though more remote, a diversion from the ocean slope peninsula creeks." (p. 223-4, Grunsky.)

And yet the money expended in planning to take care of these immediate future needs of the city referred to are in no manner allowed as values by him or the Supervisors. The theory of the administration seems to have been that there must be on the part of the complainant some capacity of magic which would enable it to be in position to take care of the demands of the city as they expand without, in advance of present needs, buying the land and watersheds necessary to take care of those future demands until the very moment that the demands were apparent. Grunsky testified (and is confirmed by all the other engineers) that such properties must be acquired from five to fifty years in advance, to avoid one of two insurmountable barriers, viz.: (1) their use for other public purposes, which would prevent their being condemned for water purposes; (2) their increase in price to such an extent as to make their acquisition impossible.

Again Grunsky testified:

"It is desirable that the combined sources of water supply for the city should be capable of yielding ultimately at least 120 million gallons per day, and that any source of supply now to be utilized or an extension

of the established system should place at least 60,000,000 gallons of water per day at the disposal of the city, and that the capacity of water works should be such as to deliver this amount of water to the city at the outset." (p. 225, Grunsky.)

And yet all elements of value in the properties of complainant which are due to the fact that they have loyally obtained the properties and the only properties available near San Francisco, so as to extend their system to produce not only 60,000,000 gallons daily but to the further amount of at least 100,000,000 gallons daily, is omitted from the engineer's figures.

All elements of value due to the favorable location of complainant's properties for the development of further water (*Metropolitan Trust Co. v. Houston*, 90 Fed. 683, 687); all elements of value due to the increased value of the properties because capable of being brought into a unified whole to take care of an increasing population (*Long Branch v. Tintern*, 62 Atl. 479; *Cotting v. Kansas City Stock Yards Co.*, 82 Fed. 850, 854); all elements of value in skill in assembling these properties, which until experimented with could not be known to have their capacity of being extended to produce 100,000,000 gallons daily (*Brunswick v. Maine Water Co.*, 59 Atl. 537-540); all elements of value because of the foresight and ability in making these locations and determining upon the value of the filter beds and reservoir sites, and in heading off possible litigation by buying water rights clear to tide water (*Brunswick v. Maine Water Co.*, 59 Atl. 537-540); all elements of value of the risk that the properties when developed might be found to have water which

would not be salable because San Francisco might not grow as anticipated, and the risk that these properties might become valueless for a thousand other reasons; all elements of value due to the fact that the money invested in these properties was necessarily tied up in such a way that they could not be withdrawn and the money invested in other enterprises (*Kennebec Water Dist. v. City of Waterville*, 54 Atl. 6, 14; *Ames v. Union Pac. R. R.*, 64 Fed. 165, 178); all elements of value due to the fact that there is a great risk in this business because the rates cannot be fixed upon the law of supply and demand, but must be left to public regulation (*San Diego Water Co. v. San Diego*, 118 Cal., 556-70); all elements of compensation due to the risk that the properties when made valuable could be taken away by the law of eminent domain (*Long Branch v. Tintern*, 62 Atl., 474-479); all elements of value due to service which was made absolutely certain by eminently skillful factors of precaution and insurance of reliability of supply; all elements of value due to the fact that by business foresight all reservoir sites capable of producing water had been obtained and held for insurance of development to 100,000,000 gallons daily (*Kennebec v. Waterville*, 54 Atl. 6-19); all elements of value of the interest which would be necessarily lost on the investment of complainant (or the municipal corporation in case they were acting for themselves) while acquiring the properties necessary to expand into a plant producing from 30,000,000 to 100,000,000 gallons daily—all these elements were omitted by the City Engineer and the Supervisors go him one better and omit all

elements of value by reason of franchise, and going concern.

The City Engineer gives the data necessary for expansion, omitting any concession that complainant must be compensated for properties owned by it to be capable of expansion.

Brunswick Water Dist. v. Maine Water Co., 59 Atl., 537, holds that:

"The property taken is a single thing, to which belong certain characteristics which affect its value. The thing cannot be taken without these characteristics. If it is attempted to value the thing separate from its inherent characteristics, elements which add value to the thing are omitted. If these elements are omitted the owner fails to receive the full and fair value of the thing and therefore is denied just compensation."

With reference to the city's duties in obtaining water properties he testified:

"The acquiring of necessary water rights and storage facilities should not be overlooked. They should be secured as opportunity offers to the end that when the time comes works may be established adequate to meet the future needs of this city." (p. 228, Grunsky.)

Complainant has a similar obligation (*Long Branch Commission v. Tintern*, 62 Atl., 474-476). The properties so acquired by complainant to comply with the engineer's suggestion are entirely omitted from the engineer's valuation.

He also said:

"The city distributing system (for the Tuolumne) would come into use without modification, except the placing of larger mains in some sections of the city to insure the best possible fire protection, and the construction of a number of new reservoirs and tanks and an improvement of the pumping facilities. It is thought

that an expenditure of \$1,000,000 in betterments of this kind would be at once justified if the Spring Valley Water Works' supply were augmented by a supply from the Sierra Nevadas, and that about \$500,000 would cover the cost of the receiving reservoir at the House of Refuge lot, and its service mains." (p. 292-3.)

And yet, while thus testifying that, with the expenditure of only \$1,000,000, he could by the use of complainant's distributing system save the city the cost of a distributing system, which he estimates at \$8,807,000.00 (p. 280, Grunsky), he only values it in his report at \$6,017,175 (p. 175, Grunsky), and this report of the value of the distributing system the Supervisors adopted.

Again, referring to a former report, he testified:

"Even though it be for the time being assumed that all (various sources) are available, that there must be a great difference in the degree of their availability. The sources are not equidistant from San Francisco. The obstacles to be overcome in bringing the water to San Francisco may in one case be trifling, in another case formidable. * * * It follows, therefore, that as applied to sources of water supply the term "available" is not necessarily applicable to every source of supply which could be utilized if it were the only source, but applies strictly only to the few sources which rank highest, not in the sense of facility of utilization, but in the broader sense of best fulfilling all requirements. * * * So long, however, as a number of sources, by reason of some advantage which each has over the others in the matter of quality of water, its quantity, reliability of service and cost, are of such rank that it remains doubtful to which the first place should be accorded, these sources are all to be considered available. * * * So long as this is indeterminate, all sources which have any reasonable prospect of being ranked first should be considered available sources." (Grunsky, 294-5.)

And yet, notwithstanding the fact that this learned engineer knew that the engineer of complainant had these same problems confronting him when he planned complainant's works from 1858 to 1880, notwithstanding that he knew that at those times many sources of information now available to the city engineer were denied complainant's engineer, notwithstanding the fact that, although the results of the experiments made by complainant's engineers and others were available to the city engineer, he himself could not decide which was the most available source, except after a very lengthy and costly investigation; and notwithstanding the fact that all the eminent engineers in this case, including Mr. Grunsky himself, acknowledge that the system constructed by Mr. Schussler is one of the best water works in the world, and that the problem of supplying San Francisco with water has been solved under difficulties which are unique, and that all engineers acknowledge that San Francisco's water plant is the most difficult to maintain; yet, despite all this, absolutely nothing is allowed in the engineer's estimate for the skill and good judgment displayed in deciding that the properties now used by complainant were the most available, and nothing is allowed for the business capacity involved in acquiring them far enough in advance to make their economical acquisition feasible.

The Maine Supreme Court has aptly phrased this intangible element of value as follows:

"It should be said that those who engage in a public service cannot be put upon quite the same level as those who make mere investments. They are not like the depositors in a savings bank, whose right to draw out

is limited to precisely what they have put in, with its earnings. They are, on the contrary, engaged in a business, with the ordinary incidents of a business, with some of the hazards and the hopes of a business. To be successful, they must be wise and prudent, thrifty and energetic. These virtues, if they have them, they impress upon the property, making it more valuable than it otherwise would have been. *Is it to be said that they can have no return for skill and good management? We do not think so.*"

Brunswick District v. Maine Water Co., 59 Atl. Rep., 537-540.

Again, Mr. Grunsky testified:

"Sources which by reason of remoteness, by reason of insufficiency of supply, cost of utilization and operation, or unusual risk in construction or permanency of service, bear a decidedly unfavorable relation to other sources, should—when the facts are brought out by competent authorities—be classed among the sources not available." (p. 295, Grunsky.)

Yet the skill and business judgment displayed by complainant in avoiding the purchase of undesirable properties is in no manner taken into consideration.

The learned engineer said:

"The availability of a source of water supply, as above stated, is determined by the quality of the water *delivered*, its quantity, the reliability of service and cost." (p. 295, Grunsky.)

That the complainant's water supply possesses all these characteristics in a high degree was testified by all the engineers produced by complainant. Mr. Grunsky himself conceded the superiority of the present supply over the proposed Tuolumne scheme in all particulars except quality; but Mr. Grunsky's estimate

of quality did not refer to water as *delivered*, but as received at the point of intake—and this in spite of the fact that all the other engineers, as has already been shown, expressed the opinion that the quality of the water from the Tuolumne source, although pure at the point of *intake*, nevertheless, in their opinion, at the time of delivery this same water would become inferior in quality to that of the Spring Valley supply. Moreover, whatever impurity might exist in the water at the source of supply, this defect could be cured by filtration before the water is delivered (Grunsky, p. 296), and this filtration, in large quantity, costs only \$2.50 to \$3.00 per million gallons (p. 3538), or approximately \$100 per day for the water now being used by San Francisco. In round numbers this would amount to \$36,500.00 a year, or the interest on about \$1,000,000.00 of bonds. Even if the learned engineers testifying for the complainant are wrong in their opinions as to quality, the only disadvantage to the complainant's plant when compared with the proposed scheme, could be cured by the installation of a filter plant at a cost of \$1,000,000.00. This adjustment in relative values would be necessary only if the Court disregards the expert opinions of disinterested engineers, who have given a lifetime to the study of the subject, such as Mr. Stearns, Mr. Hering, Mr. Schuyler, and Mr. Adams. These experts agree that the water which comes down the Tuolumne gorge and is stored in the reservoir at Hetch Hetchy in the hot sun in an open Sierra granite basin, where from June to September the heat is intolerable, thence to be carried in an open canal along the side of

a mountain for 20 or 30 miles, where pollution is certain to occur, and thence to be carried to San Francisco and again stored,—would, *when delivered* for use, not be the same pure, limpid snow-product that entered the Tuolumne reservoir but poorer in quality than the water *delivered* by complainant from reservoirs less than twenty miles distant. And yet Mr. Grunsky gives no element of value to complainant's properties by reason of their possessing superiority in every element except quality. He himself says of the relative values of two plants, where the quality of the water is involved, "that there is a possibility of capitalizing the increased operating expenses involved in purifying such water, or in guarding against possible injurious effects of contamination." This capitalization would certainly not exceed \$3,000,000.00, and, as the difference between Mr. Grunsky's figures and those of the other engineers is some \$15,000,000.00 or \$20,000,000.00, it must, of course, be a very small factor in the estimate of the real value of the intangible properties of complainant.

Again, Mr. Grunsky says:

"Another feature to be considered as having some bearing upon the availability of any source of supply is the reliability of service. Not only is it necessary that a sufficient quantity of water of good quality be obtainable from any source that is to be considered available, but the works for the utilization of this water, for its delivery to reservoirs in or very near the city and its distribution to the consumers must be of a reliable character. The water supply must be an unfailing one, not alone by reason of its abundance at its source, but also by reason of the safety of the works for its delivery.

The utilization of any undeveloped source may always be considered to involve some risk. . . . Formidable obstacles may involve great risk and great uncertainty during construction." (p. 297, Grunsky.)

And yet no element of value is given by this engineer because the complainant has, despite this risk, developed a system which can be depended upon absolutely to deliver, constantly and uninterruptedly, all the water necessary. On the contrary the engineer neglects, eliminates or minimizes such factors. The risk taken by the complainant in overcoming the formidable obstacles, and the great uncertainty involved in construction, find no elements of value in Mr. Grunsky's figures. Mr. Grunsky, however, expressed the right principle. The Supreme Court of Maine has decided that such element of value must be considered, in the following language:

"It follows we think, that the reasonableness of the rate may be affected by the degree of risk to which the original enterprise was naturally subjected. This does not mean unforeseen or emergent risks, but such as may have been justly contemplated by those who made the original investment. * * * The element of risk, however, is not controlling. It is only one element. It is to be fairly considered in connection with the other elements named."

Kennebec Water Dist. v. City of Waterville, 54 Atl. Rep., 6-14.

Again he testified:

"Constructed works are maintained at more or less risk; they are liable to injury. Those least liable to injury and most readily repaired when injured are the safest. To the extent of capacity actually utilized and demonstrated, established works of proven efficiency should therefore receive preference and rank highest in the scale of availability." (p. 297, Grunsky.)

It seems incredible that the engineer should lay down this principle and acknowledge that complainant's plant complied with the requirement of "proven efficiency," and then allow no element of value for that quality; but such is the fact.

There is another point to be noted in connection with the last quotation. Certainly, investments involving great risk should not be compensated at 4 or 5 per cent per annum, when mortgages secured by real estate valued at 140 to 150 per cent of the amount of the mortgage bring $4\frac{1}{2}$ to 5 per cent net, and 6 and 7 per cent gross.

Again Mr. Grunsky testified:

"Remoteness of a supply is a disadvantage, and between any two practically equally distant sources, the one is to be preferred which can be made available by the most reliable and the most permanent works. (p. 298, Grunsky.)

Yet, after it was demonstrated to a certainty, by the judgment of five learned engineers besides himself, that the only substantial substitutional supply available was so remote as to be highly disadvantageous, and that there was no equally distant supply to compete with complainant, nevertheless this engineer allowed no element of value for the efficiency due to nearness of supply.

Again he testifies:

"There is also to be considered the fact that in one case works may be of a character whose reliability has been established by experience and practice, and concerning the construction of which and the character of service, quality and quantity of water, no reasonable

doubts can be entertained. Such works are to be preferred to works not yet constructed, and particularly to works which involve departure from ordinary practice, and whose execution and maintenance is at more than ordinary risk." (p. 298, Grunsky.)

Yet, notwithstanding the fact that all the engineers, including Mr. Grunsky himself, agreed that the complainant's properties possess all of these elements of excellence (except Mr. Grunsky, as to quality) in a very high degree, nevertheless Mr. Grunsky has allowed no element of value for these qualities by any means to creep into his valuation given to the Board of Public Works.

Again Mr. Grunsky testified:

"Many other things may be brought into the comparison, as, for instance, the facility for a gradual increase of the capacity of conduits or other appliances required for the delivery of the water, in order that the delivery may keep pace with the growth and growing needs of the municipality. A system that must at once be constructed of a capacity to meet the probable requirement fifty or more years in the future may prove relatively expensive, and this may be rated as a disadvantage when compared with one which permits an installation which, though adapted to immediate requirements, is still capable of expansion as occasion arises." (p. 298, Grunsky.)

And yet, notwithstanding the fact that all of the engineers agree that Mr. Schussler has, with unexampled skill, created a system that can be expanded gradually, as demand requires (and that the works themselves are of the highest excellence), and that the possible advantages to be gained in the future by making certain conduits larger than necessary in order to provide for ex-

pansion have been studied with great care and the object accomplished with great skill, nevertheless no element of value therefor is found in Mr. Grunsky's figures. On the contrary he testifies that he deems that the provision of the law which requires the board to allow for those "properties which are in use" preclude him from allowing anything for those properties which are not now actually producing water to be put into the pipes from which the people are today taking water, notwithstanding the fact that in the last quotation above he recognizes the fact that a water system must be capable of expansion, and to be capable of expansion properties capable of producing water must be acquired before they are actually needed for present supply.

Again he testified:

"To permit of a fair comparison of the availability of several sources of supply, it is finally necessary to assume all work to be of the same standard of excellence, so far as practicable of the same materials and the same workmanship, and, therefore, in the same class, so far as conditions permit, principally in the matter of efficiency and durability." (p. 298, Grunsky.)

And yet Mr. Grunsky's substitutional system, with which the complainant's plant is compared, contemplates material and workmanship on the pipe line far inferior to that of complainant's system. The figures he gives on material should be increased by 60 or 80 per cent in order to allow for material and workmanship of the standard of that of complainant's plant. According to the opinion of all the other engineers, \$12,000,000.00, or \$15,000,000.00 more would have to be invested in the proposed scheme to bring it up to the standard of construction of the complainant's works.

Again Mr. Grunsky testified:

"In making the financial comparison, due regard should be had to the cost of operation, maintenance and repairs. Allowance should also be made for any greater expense occasioned by the use of more perishable materials in one case than in another, when conditions make it impracticable to bring the several projects to the same standard." (p. 299, Grunsky.)

And yet, notwithstanding the fact that all of the experts produced by complainant agree, and Mr. Grunsky himself acknowledges that the cost of any possible substitutional system must include the taking care of and repairing of at least two pipe lines from 150 to 180 miles in length, across a broad valley, under two rivers, with 30 to 50 miles of the pipe in a territory that freezes every winter, nevertheless no element of value is given to complainant's property because of its relative cheapness and ease of operation, maintenance and repair. The elements of value which the engineer in the last quotation specifically states must be taken into consideration cannot be discovered in his estimate.

The engineer testified as to the method of valuation to be followed where there was but one available source of supply, as follows:

"In this extreme case, other circumstances must be taken into consideration in determining value, even though proceedings be somewhat arbitrary in character. The cost of construction, the amounts invested in water properties, the resulting profits are then to be considered, and a fair allowance should be made for the risks at which investments were made. A comparison with other like judicious investments of the same magnitude may then lead to some conclusion as to a fair valuation.

* * * When, however, a case presents itself in which

other sources of supply are available, these can be compared on their merits. When it can then be shown that other water equal in quantity or quality can be obtained and delivered under like conditions, a comparison of cost is justifiable, but the cost of bringing in another supply should not be considered as the measure of value of the established system. In such a case the *estimated cost of constructing new works will ordinarily stand as an upper limit which the value of the established system will not exceed.*" (p. 333, Grunsky.)

And yet the engineer based his estimate on the value of the properties actually in existence only, without making any allowance for the risk involved, without comparing the investment with other judicious investment of the same magnitude, and without taking into consideration even his own low estimate of \$40,000,000.00, exclusive of interest and taxes in outside counties on unproductive real estate while building, as the cost of a substitutional plant.

Again he testified:

"This comparison is always of value and in most cases affords the best basis for conclusions as to value of water rights, and sometimes as well of the franchises of the water companies." (p. 334, Grunsky.)

And yet no such comparison was made by the learned engineer, and no such additions were made in the engineer's report to the valuations he placed on the separate pieces of property as isolated units.

2. VALUATIONS GRADUATED TO THE RATE OF INTEREST TO BE ALLOWED AS A COMPENSATORY FACTOR.

This subject has been hereinbefore discussed. It will be found preceding the discussion of the physical properties.

3. VALUATION BASED ON SALE PRICE OF STOCK.

The par value on the market value of stock, as a basis of valuation, is only serviceable as a check. By the testimony of the stockbrokers, John Perry, Jr., Jacob Barth, and Charles Sutro (pp. 5851-H-I-J-K), the normal value of the stock is between par and \$103.00.

Prior to the time the Board of Supervisors commenced to deny any returns sufficient to allow reasonable interest, this stock sold for from \$100.00 to \$103.00 per share and the present low selling prices are caused, says Mr. Sutro: "by the attempted cut in water rates, purporting the last few years to be made by the Board of Supervisors of said City and County in alleged ordinances establishing rates, and that such price is based upon such rates and not upon the value of the properties of the complainant in use in supplying water." Consequently, if we took the sale price of stock as a basis of examination, exclusive of outstanding bonds and floating debt, it would be somewhere between \$14,000,000.00 and \$14,400,000.00; but the testimony of expert accountant Reynolds shows that, inclusive of floating debt and exclusive of bonds, complainant's stockholders (if allowed current rate of interest at the several times of investment and charged with dividends on which interest is computed at similar current rate) have actually invested \$34,538,722.98 up to December 31, 1904 (p. 4622). If bonds had been included the figure would have been \$50,513,722.98.

The city attorney recognized the fact that the price of stocks had fallen because of the action of the Board

of Supervisors under the authority of the constitutional provision. During the cross-examination of witness Adams he asked the question:

"X. Q. 558. You do recognize that the provisions of the State Constitution really *hammered down* the value of the property?" (p. 5020, Adams.)

Of course the amount of "hammering down" being indeterminate, it leaves this basis of estimate valuable only as a check to the figures obtained by other methods.

With bonds added, the valuation could not be less than the normal sale price increased by bond issues and floating debt, which are as follows:

Stock at normal figure.....	\$14,400,000
Bonds in 1903	13,750,000
Floating debt	1,017,500
	<hr/>
	\$29,167,500

of course the figures in 1904 and 1905, would increase these figures *materially*.

It is to be borne in mind also that market value of stocks and bonds is not an exclusive element, but only one of many factors to be considered principally as a check of minimum value.

See Beale & Wyman on Railroad Regulation, §§ 337, 352.

4. VALUES OF COMPLAINANT'S PROPERTIES GIVEN BY
THE SEVERAL ENGINEERS WITH THEIR REASONS.

- a. *Mr. F. L. Stearns' valuation.*
- b. *Mr. Rudolph Hering's valuation.*
- c. *Mr. Herman Schussler's valuation.*
- d. *Mr. James D. Schuyler's valuation.*
- e. *Mr. Arthur L. Adams' valuation.*

[Including table showing ratio of operating expenses to investment in 16 cities.]

The values given by the several engineers vary from \$70,000,000 (p. 4256) to \$28,024,389 (p. 175, Grunsky). (The values given by the experts who took into consideration the single element of cost are not considered further.) The testimony of the engineers show their reasons for the variations. These differences are more apparent than real.

a. *Mr. F. L. Stearns' Valuation.*

Mr. Stearns testified: (p. 4256)

"The premises and methods observed in giving the present valuation of water properties that are in use in a municipal supply should vary in different cases. The method I have thought proper to observe in three cases of condemnation of works by the Metropolitan Water Board is to base the valuation of the works upon the cost of a substitute supply furnishing an equal quantity and quality of water. In these cases, however, the supply of water to Boston, and certain other cities, was taken from them and they were obliged to have a substitute supply, which was furnished to them from the general supply into which their works were incorporated.

F. L. STEARNS (*Continued.*)

"I think this method is desirable in nearly all, if not in all cases, to know the cost of an equivalent water supply and to use this knowledge in valuing the water supply to be valued, which is, undoubtedly, worth more if the substitute supply is more expensive than if it is cheaper than the water supply to be valued.

"The methods used in valuing the works in use of the complainant in this case in supplying the City and County of San Francisco and its inhabitants, such valuation to be used as a method for determining the proper compensation to be paid to complainant for its supply, in the establishing of water rates, should be such that they will give a proper valuation to be used as a basis for determining a fair and reasonable annual compensation. I have adopted three general rules, as follows: First, the physical value of the plant, including land and water rights, should be ascertained; the company which, in the absence of any contract, is required to assume all risks should be credited for all appreciation in the value of the property caused by a rise in the value of lands or water rights, or by the greater cost of constructing works at the time of the valuation, and charged for all depreciation in the value of the property due to a diminished value of lands or water rights, and to the less cost of constructing works at the time of the valuation; also with a proper amount for depreciation on account of the physical deterioration of the works, or their partial or complete inadaptability to the present requirements. In determining the value, a proper allowance should be made for interest and taxes during construction if the company has not been already compensated for such interest and taxes at such time. Second, a proper addition to the value thus obtained should be made for what is known as the "business value" of a going concern. This value should include the cost of organizing the business and establishing it on such a basis that it now has an annual revenue from nearly all the buildings in the city, and due allowance should be made for the risk taken in starting a new business which may or may not be successful. Third, an

F. L. STEARNS (*Continued.*)

examination should be made of the location, character, efficiency and economy of the works of the company for supplying water, and a comparison should be made of the cost of obtaining a substitute supply of water of equal quantity, quality and reliability from other sources. If such examination and comparison show that the works have been so located, designed and constructed as to be below a reasonable and proper standard, in location, character, efficiency and economy, then there should be a deduction from a valuation made in accordance with the first two rules; but if, on the other hand, such examination and comparison show that the works to be valued have been so located, designed and constructed as to be above the same reasonable and proper standard in location, character, efficiency and economy, then there should be an addition to the value otherwise obtained for the skill and enterprise which has produced the works of especial value.

(Q. Applying one of these principles which you have illustrated as a method of valuation, I would ask you what is your opinion relatively of the actual value of the plant of the Spring Valley Water Company now in use in supplying San Francisco and its inhabitants with water, compared with the Tuolumne scheme as proposed, and also as described and estimated in Mr. Grunsky's report upon that proposition?)

"I believe that the Spring Valley Water Company's properties in use are to-day worth much more than the Tuolumne scheme as proposed by Mr. Grunsky if it were completed at the present time at the cost estimated by him.

(Q. How much more, assuming now that you use your own views as to the proper design of the Tuolumne scheme, and your own estimates?)

"This is a very comprehensive question, as it involves not only the first cost of the works of the Tuolumne scheme, such as I would think proper, but there are other matters to be considered. First there is the comparative cost of development of the two schemes, and in estimating the cost of such development I will

F. L. STEARNS (*Continued.*)

assume that the Tuolumne scheme will continue to take water from that source, and the Spring Valley scheme to take water from the present and adjacent properties; second, there is the comparative cost of renewals in the two schemes; thirdly, there is the difference in yearly cost for taxes and operation to be taken into account; fourthly, there is the relative reliability of the two schemes. I have determined, as well as I could, the first cost of the Tuolumne scheme on what appears to me to be a conservative basis, and have also made the first three comparisons and obtained money values representing the results of such comparisons; the fourth comparison I did not attempt to reduce to a money value, but the Tuolumne scheme I regard as less reliable than the other. The final result of my computations is that the Spring Valley plant, measured by the Tuolumne scheme, has a value of \$70,000,000.

(Q. How much at Mr. Grunsky's estimate?)

"On his basis of design and estimate I make the sum \$55,000,000.

"The items of the first estimate which make a total of \$70,000,000, are as follows: The first cost of the Tuolumne scheme, \$54,400,000. Future additions to be made from time to time, reduced to their present worth in 1905, on the basis of 5 per cent interest: for the Tuolumne scheme, \$25,300,000; for the Spring Valley scheme, \$16,200,000, giving a difference in favor of the Spring Valley scheme, that is, chargeable against the Tuolumne scheme, of \$9,100,000.

"The renewals based in general upon Mr. Grunsky's estimates of the time when renewals would be required, and reduced, as in the other case, to the present worth in 1905, on the basis of 5 per cent interest: for the Tuolumne scheme, \$7,000,000; for the Spring Valley scheme, \$2,000,000, leaving, to be charged against the Tuolumne scheme, \$5,000,000. The annual expense for taxes and operating I estimated to be \$112,500 per year as the excess for the Tuolumne scheme. Considering this to be an annuity, and reckoning its present

F. L. STEARNS (*Continued.*)

worth on the 5 per cent. basis, it reduces to a sum of \$2,000,000 to be charged against the Tuolumne scheme.

"To make a summary, I have, for the present worth of these different items, as follows:

"First cost	\$54,400,000
"Additions	9,100,000
"Renewals	5,000,000
"Extra annual expense of Tuolumne scheme	2,000,000

"Total \$70,500,000

"Or, in round numbers, say \$70,000,000.

(Q. Now, as to the works of the Spring Valley Water Company that are in use, have you made that comparison with the Tuolumne scheme, or can you?)

"The sums would be the same as those I have stated; the future additions necessary take into account properities that are not now in full use." (pp. 4256-61.)

b. *Mr. Rudolph Hering's Valuation.*

Mr. Hering testified: (p. 3471)

(Q. I will ask you to give your opinion to the Court of the present value, being of course with reference to the years 1903 and 1904, under the stipulation in this case which I have explained to you, of the plant of the Spring Valley Water Company in use at those times in supplying the city and county of San Francisco and its inhabitants with water, with such added details, explanations and other matters as you deem proper to an explanation in full, and an understanding of your opinion.)

"A. In my opinion the value of this property is made up of two parts, the tangible value and the intangible value. The tangible value is made up of several parts: first, the city distributing system, including the pumping stations at Black Point and Clarendon Heights, the reservoirs, the real estate and the stock on hand in San

RUDOLPH HERING (*Continued.*)

Francisco; second, the works collecting the water and conveying it to the San Francisco distributing reservoirs, inclusive of six pumping stations; third, the rights of way, pipe lines and conduits; fourth, all real estate in the city and elsewhere; the reservoir and water shed properties located in Alameda, Santa Clara, San Mateo and San Francisco counties, the latter being the Lake Merced properties, from which water is being supplied to the city. The intangible value is a sum representing what may be called the business value—going concern, or, good will. I wish to make a correction there if I may: I stated, under the first enumeration, "real estate." That should be stricken out because I put real estate all together afterwards. It is under the fourth designation. The tangible value I found to be \$39,770,900; the intangible value I have estimated at \$5,000,000. (pp. 3471-2, Hering.)

"In round numbers the total valuation is about \$45,000,000. * * * The valuation of the material plant, namely, \$39,770,900, is what I think is a fair and reasonable valuation, excluding the intangible value. * * * I consider that \$45,000,000 is a fair and reasonable valuation of all the property in use." (pp. 3472-3, Hering.)

* * * * *

(Q. Looking upon this property and plant as a business venture, embodying in a certain way risks of investment, and resulting in a successful operation and the accomplishment of the purposes which were had in view by these investments, is there any other method by which a valuation might reasonably be placed upon the property?)

"A. The answer to that question is that it is usual, in water works practice, to value works on the basis of alternate propositions for a water supply. Water works are valued in that way. That is another method. (p. 3473, Hering.)

(Q. What necessary additions would be required to make structural estimate of the Tuolumne scheme complete?)

RUDOLPH HERING (*Continued.*)

"A. I should say that several sums should be added, one of which relates to an increase of cost of the iron pipe. I have considered this factor alone in detail, and believe that it is true that an additional expense, to have an iron pipe equally as good as that which is now laid to Alameda, of \$12,694,000 would be required. I have also added, because I consider it proper, a sum which would represent the interest on the moneys invested during construction, prior to any monetary yield of the invested capital, and I have allowed \$2,800,000, making the estimate, which I consider a minimum one, and most likely in practice to be greater, for constructing the Tuolumne scheme project, at \$55,000,000. (p. 3474, Hering.)

"In my opinion, the cost of the most feasible alternative project to supply this city with water of equally good quality and equally good quantity, being \$55,000,000, the maximum value of the present works could not, in my opinion, exceed this sum,—taking the Tuolumne scheme as outlined by Mr. Grunsky as the alternative system." (p. 3475, Hering.)

(Q. Taking the basis of an alternative proposition as a method of estimating value, or maximum value, what sum would you deduct to render the maximum value, in your opinion, a fair, reasonable and proper value?)

A. "I have given what I think is a fair value of the works, and have added a sum, as I stated, for the intangible value, to the tangible value of the physical works which, I think, is fair, although I have added but about one-third of the difference between what is evidently to my mind the lowest value, namely, that of the physical value, and the highest value, which is that of the next alternative scheme. I would consider that this value which I have given is the least value which would be fair." (p. 3476, Hering.)

(P. 3477). "I consider that it is entirely proper to include, in the valuation of the present works, such properties as it was essential to acquire in order to secure for a long term of years, as I have already stated,

RUDOLPH HERING (*Continued.*)

the water necessary to supply this city. * * * I have not, however, included the value of any water rights in my estimate beyond those now used.

"In valuing the water rights that pertain to these 65,000,000 gallons that could be produced in the future, I would endeavor to get the present value of the water rights capable of furnishing the 65,000,000 gallons in 40 years, at which time it is estimated that the extra 65,000,000 gallons would be required; the present value would be obtained by discounting the value in 40 years, that is, in 1945, when 65,000,000 gallons, estimated at \$150,000 a million would amount to \$9,750,000, which sum, discounted to the present time, would be \$945,000. In my opinion that would be a fair valuation of the present value of the water rights for these 65,000,000 gallons which would not be utilized completely until 1945.

"In many Eastern cities the water is taken from streams or lakes which furnish them with their entire supply irrespective of any storage. In those cases no expense attaches to storage. In San Francisco, at present, about one-half the water is obtained entirely through storage; the other half being taken from the Alameda Creek system, the low water flow of which at present supplies sufficient water, but the necessity of increasing the supply by artificial storage reservoirs in a very few years already exists in that valley.

"As it takes about five times the storage capacity here to furnish the same uniform delivery of water as it does in the East, the cost of stored water here will naturally be more. I would roughly estimate it, as a general proposition, to be about three times more here. (p. 3479.)

"As compared with the proposition of water in the East drawn from lakes or water courses of sufficient size compared with San Francisco, here there would be an additional expense due to the provision of storage reservoirs, none of which are needed in the other case.

"The greater cost of iron in California than in the

RUDOLPH HERING (*Continued.*)

East also increases the cost of a plant here. The iron used here is brought from the East, for the most part, and it is necessary, therefore, to pay, in addition, for the freight to get it here." (pp. 3477-79, Hering.)

On cross-examination Mr. Hering gave the detail of these figures:

"The total tangible value was \$39,770,900; that is made up of five items, namely, the city distributing system at \$7,700,000; works for collecting and conveying water to distributing reservoirs, \$11,949,000; rights of way, \$517,000; real estate for storage reservoirs, watersheds and other purposes, \$12,498,900; water rights, \$7,106,000." (p. 3721, Hering.)

c. *Mr. Herman Schussler's Valuation.*

Mr. Schussler, when asked to give his opinion of the values of the properties of complainant "which are in use, what those values are," and his grounds in full for his opinion, testified as follows (p. 1552):

"In former decades, when the great value of water properties such as water rights, reservoir sites and watersheds was known and appreciated by but very few, the Spring Valley Water Company, having made a thorough, systematic and scientific study of the matter, and knowing and appreciating that such properties—especially where they occurred nearby and combined in one locality, and of proper dimensions and proportions—if they were to be acquired at all must be acquired early, privately, systematically and with the sole object in view to form the various purchases, when fairly rounded off, into groups and complete units, each unit containing within itself the three essential requisites of water rights, reservoir sites and watersheds; all of such groups of properties, being so located with reference to each other and so connected with each other by the principal works, so that the combination of all of them

HERMAN SCHUSSLER (*Continued.*)

combined with the works would form one grand inseparable unit.

"To make the many hundreds of purchases that were necessary required great study, great circumspection and discretion and much time. The purchases were made carefully and slowly and at intervals so as not to excite the owners of properties that still had to be purchased. Thus, the purchases naturally had to be made ahead of time, as, if the owner or owners of lands and rights that were still to be acquired knew of their intended purchase, their asking price would at once rise beyond or out of all proportion. It was impracticable in most cases to resort to condemnation proceedings as this would not only show to the public that the properties were intended for the all-important purpose of a domestic water supply, thus at once largely increasing the value and the prices of all the properties not yet purchased, but also the delay caused by such method of acquisition might prove fatal to the completion of the whole group of properties in time to meet the growing wants of the city for an ever increasing water consumption. The most expeditious way, therefore, of acquiring such properties was the private purchase from time to time of separate tracts, looking far ahead so that by the time the water supply had to be developed on the property the whole, or at least the principal and controlling features of the entire contemplated group of properties, were owned by the company. Thus, work could be commenced, leaving the unpurchased portion, if any, to be acquired either by purchase or by condemnation later on. The latter method was avoided as much as possible except in such cases where the owners absolutely refused to sell, but instead invited condemnation proceedings, and where the properties in question were absolutely needed to complete the ownership of an important and indispensable property, such as a large reservoir site.

"In the above described manner the five important groups of water producing properties of the Spring

HERMAN SCHUSSLER (*Continued.*)

Valley Water Company were acquired, namely, the Pilarcitos, San Andres, Crystal Springs, Lake Merced, and Alameda Creek systems. Only in the case of the Crystal Springs properties were we compelled to resort to condemnation proceedings in reference to the reservoir site properties. The main prominent condemnation case in connection with the Crystal Springs reservoir property, in which large tracts within the reservoir site were involved, after causing great difficulty and dangerous delay was settled out of court. When the Spring Valley Water Company, in 1882, settled the condemnation case with Hayward and others out of court, the company acquired a total acreage of land, in and adjoining the proposed Crystal Springs reservoir site, of 989.7 acres, of which about 170 acres were located in the reservoir site and about 820 acres were located in the adjoining watershed. For this property and the rights connected therewith the Spring Valley Water Company paid, in October, 1883, the sum of \$396,645.83 in cash, and also agreed to furnish perpetually, free of charge, into the defendant's reservoir near San Mateo, at an elevation of about 125 feet above tide, 300,000 gallons per day. The Spring Valley Water Company in closing this purchase proportioned the respective values of the various properties and rights so acquired at approximately the following rates:

170 acres of reservoir site at \$1500 an acre . .	\$255,000
820 acres of watershed property at \$100 an acre	82,000
Water rights that had been acquired by de- fendant relating to a daily supply of about 300,000 gallons a day	60,000

Total cash paid, in round figures \$397,000

as an additional compensation to the defendant for two small embankments forming two comparatively small reservoirs in the Crystal Springs Valley, which dams would be submerged by the construction of the proposed main Crystal Springs dam, the company

HERMAN SCHUSSLER (*Continued.*)

agreed to deliver the above 300,000 gallons of water forever, free of charge, into the defendant's distributing reservoir near San Mateo; the defendant also reserving the right to take up and remove and convert to his own use, as his own property, all appurtenances of his former water works such as all water pipes, water gates and so forth.

"Purchases of large groups of water properties which the company acquired with great caution, patience, circumspection and discretion, by private and separate purchases, taking, in some instances, fully 25 years to complete one group—I say such purchases could not now be made because their large additional value as water properties, over and above their original value for farming purposes, is, at the present time, fully understood by the public. Besides, and especially relating to reservoir sites and watersheds on the peninsula—particularly in the Crystal Springs and San Andres Valleys—another large increment of value has been added to these lands during the past decade, that is, their value for suburban residence purposes, if they had not at an early time been devoted to water works purposes. These properties, being located so near to San Francisco, could easily and quickly be reached by fast-running electric car lines to and through the entire length of these two beautiful, well-wooded and well-watered valleys, the climate of which is very mild and even compared with San Francisco, making them and their wooded slopes a most attractive and desirable locality for suburban residence purposes. If these lands had not been reserved and devoted at the time that they were to water works purposes there is no doubt that at the present time practically the entire valleys and slopes would have been subdivided into hundreds of small parcels, and largely improved and greatly enhanced in value by the construction of many suburban residences. What in such case would now be the cost of purchasing or condemning the entire improved properties, valleys, hill-sides and water rights from a large number of private owners, in order to convert them to water works pur-

HERMAN SCHUSSLER (*Continued.*)

poses similar to the present use, is impossible to conjecture because, in order to bring all of such properties back into the present unified shape of a first-class successful water property, every one of the many owners of such subdivisions and improvements would have to be settled with, practically to his satisfaction, requiring, if it were at all feasible, an enormous outlay and a great deal of time.

"What these water properties are now worth, after their effectiveness and inestimable value for water works purposes, particularly under our variable and erratic climatic condition, has been proven by many years of successful operation and by having proven their adaptability to a much greater and more important future use than the present one, in that the three peninsula reservoirs can be developed and increased up to a joint storage capacity of over 50,000,000,000 gallons, thus giving ample room to also store therein in the future the surplus waters of the Alameda Creek system, cannot now be gauged at so much per acre which the reservoirs and their respective watersheds may contain. The time of acre valuation has passed. These properties can now only be valued as one combined entirety, as an effective, well-developed, well-connected, large water works unit now supplying all the present wants of San Francisco and capable of economical periodical and successive further development up to a capacity of nearly three times their present capacity of 35,000,000 gallons a day. The only possible method of valuing this grand and unique combination of water properties is as one unit, compared with the cost and value of another unit of similar initial capacity and capable of being developed up to the same future capacity, and having the same degree of safety and reliability and the same perfect title to all of its properties and rights." (p. 1556, Schussler.)*

* His prognostications for the future, and his reasons therefor, are given by Mr. Schussler as follows:

"That it is wise and proper for a municipality or for a private

HERMAN SCHUSSLER (*Continued.*)*Footnote, continued.*

corporation supplying a rapidly growing city with water to look ahead for the future and prognosticate the probable needs in the future of this most essential element necessary for its complete comfort, health and fire protection—in short, for its existence—namely, a reliable and abundant supply of good, potable water, secured not only for the present but for the future needs, is abundantly proven not only by the past history of the growth of the demand for water in San Francisco, but also by many Eastern cities, particularly the great commercial metropolis of the United States—New York City. Its water works have been largely increased several times in the past, and the city will soon again be on the verge of a short supply unless rapid progress is made in the construction and completion of new and additional contemplated works. The study of the record of the past growth of Greater New York's population and the water supply offers to the commission in charge of said work—which commission is composed of some of the most competent and learned men in the profession of hydraulic engineering—the most reliable basis upon which to base its calculations for the city's future needs.

"The results of these studies are shown in two reports published on the subject. One is Mr. Freeman's report to the Comptroller, dated March 23, 1900, in which he estimates, on page 66, that the following increase in the per capita consumption would be a safe ratio for the twenty-five years—from 1905 to 1930:

Year.	Per Capita Consumption.
1905.....	125 gallons
1910.....	130 "
1915.....	135 "
1920.....	140 "
1925.....	145 "
1930.....	150 "

"In the same report, in a diagram following page 86, while showing the past growth of the population of Greater New York, in order to establish a basis for plans and estimates of the much-needed future water supply extensions, he also shows a careful estimate, based upon the past and the present, of the probable growth of population of Greater New York City up to 1930. The tables of past and probable future population of Greater New York is as follows:

Year.	Number of Inhabitants.
1870.....	1,468,000
1880.....	1,904,000
1890.....	2,741,000
1900.....	3,500,000

HERMAN SCHUSSLER (*Continued.*)*Footnote, continued.*

	Estimated Smallest Probable Population.	Estimated Largest Probable Population.
1910.....	4,200,000	4,550,000
1920.....	5,040,000	5,685,000
1930.....	6,050,000	6,825,000

"In the joint report of the commission, dated November 30, 1903, on page 67, the population of Greater New York is approximately estimated to be 6,320,000 in 1925, which, at a daily per capita consumption of 150 gallons, would then require 948,000,000 gallons a day for Greater New York City.

"Based upon the present experience of the Spring Valley Water Company, extending over more than four decades, and coupling these results with the present and future outlook, this company has not only prognosticated its future needs heretofore and successfully acted accordingly, but, based upon careful studies of the principal elements that contribute toward the growth of this city and its most essential necessity—a water supply—has made a very careful and conservative estimate of the future needs during the first half of this century, thus building up a reliable basis upon which to formulate its future plans to meet the growing needs in the most effective and economical manner. According to the former City Engineer's Tuolumne report—the report of Mr. Grunsky—the city is expected to use the following amounts of water daily during the following years:

Year.	Estimated Daily Consumption.
1908.....	32,410,000 gallons
1913.....	34,840,000 "
1923.....	41,060,000 "
1928.....	44,190,000 "
1933.....	47,300,000 "
1938.....	50,470,000 "
1943.....	53,740,000 "
1948.....	57,300,000 "

"By interpolation, at the end of each decade this daily consumption, assumed by Mr. Grunsky as a basis of his cost estimates of the Tuolumne scheme, would be, in round figures, as follows:

1910.....	33,300,000 gallons a day
1920.....	39,000,000 " "
1930.....	45,400,000 " "
1940.....	51,700,000 " "
1950.....	59,500,000 " "

"According to the Spring Valley Water Company's most conservative estimate, which is based upon the practical experience of

HERMAN SCHUSSLER (*Continued.*)*Footnote, continued.*

many years, the daily consumption in these years will be fully the following amounts, to-wit:

1910.....	40,000,000 gallons a day
1920.....	55,250,000 " "
1930.....	72,000,000 " "
1940.....	90,250,000 " "
1950.....	110,000,000 " "

"Placing these two estimates side by side, namely, that of the former City Engineer and that of the Spring Valley Water Company, we have the following comparison:

Year.	Estimated Daily Consumption by C. E. Grunsky, Former City Engineer.	Estimated Daily Consumption by Spring Valley Water Company.
1910.....	33,300,000 gallons	40,000,000 gallons
1920.....	39,000,000 "	55,250,000 "
1930.....	45,400,000 "	72,000,000 "
1940.....	51,700,000 "	90,250,000 "
1950.....	59,500,000 "	110,000,000 "

"Taking this low estimate of the daily water supply as a basis, the City Engineer states on page 109 of his Tuolumne report, dated July 28, 1902, that having first built, prior to 1908, two pipe lines from the Tuolumne Canal to San Francisco of 30,000,000 gallons daily capacity each, or of a joint capacity of 60,000,000 gallons a day, 'about 1950 it would be necessary to increase the capacity of the supply pipes and to enlarge the power stations and pumping plants.' A little further down, on the same page, he says: 'No loss of interest during construction has been taken into account in the above exhibits, because it need not be covered by the bond issue; the interest paid out during construction would not be a charge against the construction account, but would be raised from year to year by taxation.'

"The first paragraph quoted shows that in the Tuolumne scheme, after first basing the supply capacity and the cost of the conduits on an entirely too low estimate of the future daily consumption up to 1950, the engineer does not propose to lay the third pipe line of 30,000,000 gallons daily capacity until about the year 1950; that is to say, at a period when, according to his own entirely too low estimate of consumption, the 60,000,000 joint capacity of his first two pipe lines has been practically reached by the city's daily average consumption. In other words, no third or safety pipe line has been provided for by him during this long period of nearly half a century.

"There are four prominent features in the estimates of the Tuolumne scheme, as made by the former City Engineer, that combine to place the result of his estimate far below the actual cost.

HERMAN SCHUSSLER (*Continued.*)*Footnote, continued.*

These items are, first, that he has underestimated by a very large percentage the future requirements of the water in this city. Second, that he omits the construction of a safety pipe to act partly as a safety factor to the main lines; and even for argument sake, allowing his low estimate of consumption in 1950, he postpones the construction of the third main supply pipe, with its power stations, far beyond a safe limit of time. Third, in his estimates of cost of main conduit lines he assumes, inclusive of the 10 per cent for incidental and contingent expenses, for a total weight of fully 272,000,000 pounds of wrought iron 48-inch pipe, complete in the ground and ready for service, a cost of only about 7 cents per pound, while the Spring Valley Water Company's pipe lines of similar sizes, but made of the very best laminated iron and manufactured and laid with the best care and workmanship and proper economy, cost, inclusive of 10 per cent for incidental and contingent expenses, engineering, superintending, etc., $11\frac{2}{3}$ cents per pound of plate iron used in the pipe, complete in the ground and ready for service.

"The Spring Valley Water Company's pipe lines are laid very much nearer to San Francisco and in more accessible places than the location of the proposed Tuolumne pipe lines, requiring a lesser expenditure for transportation than for the Tuolumne pipe line; also the cost of the proposed Hetch Hetchy dam will probably be considerably increased over the City Engineer's estimates, as well as the cost of the Tuolumne River conduit, if properly lined and covered as it should be with masonry or concrete. Fourth, in his estimates of cost, the interest during the construction, amounting to several millions of dollars, has been omitted.

"Thus, combining the underestimate of the future daily consumption with the omission of a safety pipe line, the large underestimate of the cost principally of the large main 48-inch pipe lines, and with the omission of interest during construction, he arrives at his estimate of cost of the works complete, delivering the water at a point about 200 feet elevation near the San Francisco county line, of \$30,724,000. To this sum he adds, as estimated cost of a city distributing system, \$8,807,000, making his total estimate \$39,531,000." (pp. 1557-63, Schussler.)

"To this low result, of course, his low estimate of the daily consumption contributes largely. The City Engineer proposes to have the annual sinking fund contribution raised by taxation, and he proposes to raise the interest during the construction of these works by taxation." (pp. 1568-72, Schussler.)

HERMAN SCHUSSLER (*Continued.*)

Mr. Schussler then goes on (pp. 1563-68) to show that the total cost of the Tuolumne works, when completed with the three 48-inch pipe lines, appurtenances, and pipes in the city, would be \$75,000,000, and continues (taking account of the bonded debt required to produce this plant) by showing that with proper allowances for expenses, the cost to the city per 1000 gallons from the Tuolumne system between the years 1908 and 1928 would be 19.51 cents to 29.38 cents, instead of 8.20 cents to 16.40 cents estimated by Mr. Grunsky. (p. 1571.)

Mr. Schussler also testified: (p. 1514)

"In order to ascertain the present unit value of all of the lands and rights of the Spring Valley Water Company at its headwaters, such as reservoir sites, watersheds and water rights, and including also the water rights to the outflow of Lake Merced, filter beds and artesian lands, I shall deduct the total cost heretofore detailed of all of the constructed works of the Spring Valley Water Company now gathering, storing and protecting its water supply and conveying it to its distributing reservoirs, and including also the value of Lake Merced property, minus the water rights to its outflow, and also including the Millbrae and Belmont pumping properties from the total of \$45,900,000 which represents the cost, when completed, of the Tuolumne scheme complete, with its two 48-inch pipe lines, and exclusive of its reservoir and distributing pipe system.

"The cost of the constructed portion of this part of the Spring Valley Water Works which, inclusive of 10 per cent for incidental and contingent expenses, engineering, superintending, etc., and 5 per cent for interest during construction, as heretofore shown, is as follows:

HERMAN SCHUSSLER (*Continued.*)

COST OF STRUCTURAL PROPERTIES.

Pilarcitos system	\$1,168,000
San Andres system.....	1,580,000
Crystal Springs system.....	3,827,000
Locks Creek system.....	419,000
Alameda Creek system.....	3,382,000
Lake Merced drainage system.....	343,000

The following figures as to pumping stations include 10 per cent for incidental and contingent expenses, etc., but exclude 5 per cent for interest during construction:

Belmont pumping station....\$	356,900
Millbrae pumping station....	357,000
Pilarcitos pumping station....	35,000
Crystal Springs pumping station	165,300
Lake Merced pumping station.	357,000
Ocean View pumping station.	31,000

Total for these six pumping stations, which belong to the outside works.....\$1,302,200
 Adding to this 5 per cent during construction 65,110

We have a total of.....	\$1,367,300
Lake Merced property, 2,730 acres at \$1500 per acre.....	\$ 4,095,000
Millbrae property	25,000
Belmont property	25,000
Total	<u>\$16,231,300</u>

or, in round figures, \$16,231,000.

"Deducting, from what it will cost to bring the supply that two 48-inch pipe lines can bring safely to San Francisco, exclusive of the city distributing works, which cost is.....\$45,900,000
 the above mentioned total of..... 16,231,000
 we have a balance of.....\$29,669,000

HERMAN SCHUSSLER (*Continued.*)

as the value of the entire combination of all of the properties, reservoir sites, watersheds and water rights of the Spring Valley Water Company in San Mateo, Alameda and Santa Clara counties, also including the water rights pertaining to the outflow of Lake Merced in San Francisco county, when compared with the Tuolumne scheme when constructed on the plans adopted by the city, and of a safe capacity of supply equal to the present capacity of the Spring Valley Water Company's works.

"The properties of the Spring Valley Water Company, the value of which is represented by this sum of \$29,669,000, comprises the following:

"1. The exclusive water rights pertaining to the outflow of Lake Merced, yielding an average of 3,000,000 gallons net per day.

"2. All of the lands in San Mateo county, as shown on Complainant's Exhibit 18, amounting to 18,740 acres, more or less, in that county, and including the reservoir sites of Crystal Springs, San Andres and Pilarcitos reservoirs, having a joint present capacity, exclusive of Lake Merced, of 25,500,000,000 gallons which, by acquiring a comparatively small additional tract of land can be increased by construction to a joint capacity of over 50,000,000,000 gallons in these three peninsula reservoirs.

"3. All of the water rights following the courses of the streams down to the Pacific Ocean and to the bay of San Francisco, respectively, pertaining to this well rounded off system and to all of the tributary creeks, streams and watersheds; the daily water yield of this system to which these water rights pertain being 18,000,000 gallons a day.

"4. All of the lands owned by the Spring Valley Water Company on the Alameda Creek system and being located in and adjoining the Sunol filter beds and the San Antonio Valley reservoir site, in and adjoining the Calaveras reservoir site and in and adjoining the reservoir site on the Arroyo Valle; and also the artesian lands on the Laguna Creek near Pleasanton; the

HERMAN SCHUSSLER (*Continued.*)

entire acreage of all of these lands being 27,633 acres; this is on the East side of the bay. On this property are located the Calaveras, San Antonio and the Arroyo Valle reservoir sites, of a proposed joint capacity of 45,000,000,000 gallons, and the watersheds that protect them, also the magnificent natural self-cleansing filter beds in Sunol Valley, of an acreage of about 1000 acres, while the artesian lands near Pleasanton have been developed by boring a number of flowing wells thereon. The joint average daily furnishing capacity of the Alameda Creek system as at present developed, without the construction of the reservoirs, now yields an average supply of about 15,000,000 gallons a day. By constructing the three proposed reservoirs, namely, Calaveras, San Antonio and the Arroyo Valle, the daily average yield of this portion of the Alameda Creek system properties, inclusive of the gravel bed and artesian outflow, can be developed, as shown, to a total of 75,000,000 gallons a day.

"5. All of the water and riparian rights are also included in this value, following in a continuous chain along Alameda Creek to the bay, and pertaining to the outflow or water yield of the combined Alameda Creek system, not only relating to its present partly developed water yield but also to the largely increased water yield—being about five times its present yield—to which it can and will be hereafter developed.

"Comprised in the above valuation of \$29,669,000 is an area of land in San Mateo, Alameda and Santa Clara counties combined, of 46,373 acres, or about 72.45 square miles of water property located around the bay of San Francisco and in close proximity to the rapidly growing center of population. This large tract of land contains reservoir sites, watersheds, filter beds and artesian properties, which water sources as now developed are furnishing a daily average supply of 35,000,000 gallons, supplied partly by developed subterranean water and partly by water drawn from the storage reservoirs at present developed up to a total storage capacity, inclusive of Lake Merced, of about 28,-

HERMAN SCHUSSLER (*Continued.*)

000,000,000 gallons, which total storage capacity can be increased by raising and adding to the Crystal Springs dam and by constructing the Calaveras and San Antonio and Arroyo Valle dams to a total storage capacity of between 99,000,000,000 and 100,000,000,000 gallons, by which work the water supply from the peninsula and that portion of the Alameda Creek system above Sunol dam can be brought to a regular furnishing capacity of in the neighborhood of 100,000,000 gallons a day consumption which will probably not be reached by San Francisco until the year 1945, or, say, 40 years from now. In the same valuation are also included all of the water rights pertaining to not only the present daily average water yield of 35,000,000 gallons, but also to the future water yield of about 100,000,000 gallons a day to which this property can easily be developed gradually, economically, step by step as the demand for water in San Francisco increases during the first half of the present century." (pp. 1574-79, Schussler.)

Mr. Schussler also testified: (p. 1584)

"RECAPITULATION.

"Total cost of construction of works of the Spring Valley Water Company, including rights of way, including the value of the Lake Merced property, including all city property and the properties at the Belmont and Millbrae pumping plants, as heretofore detailed. . . . \$26,500,000

"The combined value of all the other properties of the Spring Valley Water Company, being the lands and rights such as reservoir sites, watersheds, artesian lands, filter beds and water rights to all its streams in San Mateo, Alameda and Santa Clara counties; also including the water rights to the outflow of Lake Merced 29,669,000

"Making a grand total of \$56,169,000

HERMAN SCHUSSLER (*Continued.*)

or, in round figures, \$56,000,000." (p. 1584, Schussler.)

Mr. Schussler also testified: (p. 1585)

(Q. In your opinion what are the actual values of the properties now in use—all the properties and plants and everything now in use?)

A. "My estimate contains some of the lands at headwaters which are not now in use; for instance, 4440 acres in the Arroyo Valle district, and in the neighborhood of 1500 acres more or less in the Locks Creek region, in San Mateo county, on the Coast streams. Adding these two acreages together not now in use, which would total 6000 acres, and deducting its value from the total heretofore given, inclusive of its properties of watersheds, reservoir sites and water rights, we would have to deduct about 13 per cent of the total of \$29,669,000, or, in round figures, \$3,856,000. Aside from this property just mentioned there is not in use at present the reservoir tract in the rear of the House of Correction, usually called the Industrial School reservoir tract, which, in my estimate, is valued at \$125,000. Furthermore, there is not now in use what is called the Market Street reservoir and central pumping tract, which is valued, in my estimate, at \$400,000. Deducting the total of these three items not now in use from the grand total heretofore given by me we have the following:

"Arroyo Valle district and Locks Creek

region	\$3,856,000
Industrial School reservoir tract.....	125,000
Market Street reservoir and central pump-	
ing tract	400,000

Total	\$4,381,000
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or, in round figures, \$4,500,000.

From the grand total heretofore given,

to wit	\$56,000,000
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Deduct the value of properties not now in

use	4,500,000
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We have	\$51,500,000
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HERMAN SCHUSSLER (*Continued.*)

as the value of the properties and works combined now actively in use in supplying San Francisco with water." (p. 1585-6, Schussler.)

d. *Mr. James D. Schuyler's Valuation.*

Mr. Schuyler testified: (p. 5448)

Q. Please give your opinion as to the valuation of the properties of the complainant at the present time, that is, speaking of the years 1903, 1904 and 1905, used in the supply of San Francisco and its inhabitants with water by the Spring Valley Water Company, and useful for that purpose; add such details, explanations, grounds and reasons fully in reference to these valuations.

A. "My estimates of the probable original cost and present value of the construction features of the plant in use and useful in the service and serving the city of San Francisco and its inhabitants with water are as follows:

(*See opposite page.*)

JAMES D. SCHUYLER (*Continued.*)

Pilarcitos system	\$ 917,447
San Andres system	1,172,389
Crystal Springs system.....	3,017,901
Locks Creek aqueduct.....	332,845
Alameda Creek system.....	2,587,859
Lake Merced system.....	241,553
City distributing reservoirs.....	716,739
Pipe system in city, and stock on hand...	5,168,055
Pumping plants, taken from Mr. Schussler's estimate, as I have not been furnished with a schedule and am unfamiliar with the probable cost of these plants..	1,432,000
Total	\$15,586,788

"To this I add the following:

"For unavoidable omissions from schedule, and for engineering, legal expense, administration and contingencies, 10 per cent	\$ 1,558,679
"For interest on idle capital in each structure during time prior to its coming into service, assumed to average one year, at 5 per cent.....	<u>779,339</u>
"Total probable cost of constructed works now in service, exclusive of real estate and water rights.....	\$17,924,806

"The original investment in real estate and water rights I have been unable to ascertain. The books do not definitely segregate this line of investment from construction, and I do not know that it is possible to make the division with any degree of exactness. The testimony of Mr. George W. Reynolds shows the computed investment to be as follows, up to December 31, 1904:

"Direct contribution of stockholders.....	\$ 9,177,496
"Deficiencies in current interest, computed by crediting investment and interest each year, after deducting dividends and interest	25,351,226
"Amount due bondholders.....	<u>15,975,000</u>
"A total investment of.....	\$50,513,722

JAMES D. SCHUYLER (*Continued.*)

"After the adoption of the new constitution in 1879 the rate-fixing power was vested in the Board of Supervisors of the city and county, and at a subsequent investigation an expert examination of the books of the company was sworn to at a hearing of the Supervisors, and published in their proceedings, from which it appeared that the total cash investment up to December 31, 1879, was the sum of \$13,168,693.

"To which was added the aggregate sum of unpaid interest on the stock of the company, representing the deficiency in the established water rates to meet current interest on the investment, which sum must be considered as the cost of establishing the business. \$ 5,671,509

"Making a total investment to Dec.
31, 1879 \$18,840,202

"The annual reports of the company filed with the Board of Supervisors as required by law show the sums invested each year in construction since 1879, and up to Jan. 1, 1904, to be. 17,242,050

"Making a total of. \$36,082,252

"If to this sum were added the increase in the value of the real estate and water rights, the result would, in my judgment, be fairly indicative of the reasonable value of the property for rate-fixing purposes, provided that the resultant sum was not in excess of the amount determined as the sum upon which the value of the service rendered would return current rates of interest. It is an exceedingly difficult matter to properly appraise the value of the real estate and water rights, or to ascertain their increase in value, but for general results

JAMES D. SCHUYLER (*Continued.*)

I have endeavored to approximate it in the following way:

	\$13,168,693
"Total cash investment as per books, not including interest, was, as before stated, in round figures	17,242,050
	<hr/>
	\$30,410,743
"Deducting my estimate of cost which did not include real estate or water-rights, and which is, in round figures	\$30,410,000
	<hr/>
"The remainder represents the total investment in real estate, water rights, and abandoned structures	17,924,000
	<hr/>
"The abandoned structures represent an estimated original investment of about . .	12,486,000
	<hr/>
	947,000

"Deducting which, the remainder is. . . . \$11,539,000

"representing the approximate investment in real estate and water rights.

"To reach an approximate idea of the present value of the real estate and water rights protected by the lands owned by the company, the most rational method, in my judgment, is to ascertain approximately the cost of a substitutional system of works, by which the water supply now available for the city's use may be duplicated. After an exhaustive study by the City Engineer of the various sources of water supply which might be brought to San Francisco, the Tuolumne River was selected and officially adopted as the most feasible of all the sources, and complete estimates of cost were prepared, based on the construction of two lines of 48-inch pipes, to have a capacity of 30,000,000 gallons each daily.

JAMES D. SCHUYLER (*Continued.*)

These estimates were summarized as follows:

"Works for storage and delivery of water.	\$30,724,000
"The City distributing system.....	8,807,000

"Total	\$39,531,000
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"On careful analysis of the details of this estimate, I find it necessary to make certain substantial additions as follows:

"For construction of a reinforced concrete conduit, 8 feet in diameter, as a substitute for the open canal, 27.83 miles long, planned with a width of 9 feet, depth 5 feet, the conduit to cost \$13.60 per foot, or \$71,800 per mile..	1,998,194
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"Deficit in estimated cost of iron in pipe lines, amounting to an average of 2.3 cents per lb. on a total of 279,422,000 pounds	6,426,700
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"Increase of 50 per cent in required capacity of pumps at the Belmont reservoir, adding one half to estimated cost..	198,500
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"Interest during construction period of seven years at 4 per cent for one-half of the period	6,741,615
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"Total cost of substitutional system.....	\$54,896,000
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or, in round numbers, \$55,000,000.

JAMES D. SCHUYLER (*Continued.*)

"This estimate presupposes that the water rights on the Tuolumne River will cost nothing. The estimates of the city rights of way outside of the city, and \$737,000 for reservoir sites, etc., in the city.

"The difference between this revised estimate of probable total cost of the substitutional system, after deducting the allowance in it for real estate plus interest (or \$52,579,000) and \$36,082,000, the estimated cost of the Spring Valley Company's works, as heretofore deduced is.....\$16,497,000

"which figure may be taken as in a measure giving a rough indication of the probable increase in value of the real estate and water rights since they were purchased, as shown by comparison with the cost of obtaining an equivalent supply.

"Adding to this the approximate original cost, as heretofore adduced.....\$11,539,000

we have a total value of real estate and water rights of.....\$28,036,000
or nearly 2½ times the original cost, a very reasonable increment, considering the general growth of the country and the advance in values of other properties.

"Adding to this figure my estimate of construction cost of 17,924,000

The total value becomes\$45,960,000

"or, in round figures, \$46,000,000, which represents the value of the plant as demonstrated by the method of comparison with the substitutional system, including the value of the business as a going concern.

"In my judgment, the reasonable valuation of the property for rate-fixing purposes is not far from this figure, or between this and \$40,000,000.

"In considering the question of the probable increase in value of the lands and water rights held by the company, I have no means of knowing or ascer-

JAMES D. SCHUYLER (*Continued.*)

“taining the probable cost at this time of purchasing
 “similar situated lands and water rights—I am assum-
 “ing there were such—in the open market, with the
 “full knowledge by the owners of the purposes to
 “which the property was to be put, but it does not re-
 “quire a great stretch of imagination to estimate it at
 “figures approaching those derived from comparison
 “with a substitutional equivalent which, as heretofore
 “noted, has been based on the assumption that water
 “rights of such system from the Sierras would cost
 “nothing. These figures are made to illustrate the
 “fact that the investments have been prudently and
 “judiciously made, and are within reasonable bounds,
 “especially when it is borne in mind that from this
 “property additional water supplies, to the extent of
 “at least 66,000,000 gallons daily, may be developed
 “without further outlay, except that required to build
 “the reservoirs to store, and the conduits to transport,
 “the augmentation of supply from these nearby and
 “convenient sources.” (pp. 5448-53, Schuyler.)

Mr. Schuyler also testified: (p. 5454)

“Q. 233. From your knowledge of the values of wa-
 ter plants and properties in this State, and leaving out all
 question of book values or comparative values with
 substitutional system or sources of supply, I would ask
 if the figures of valuation which you have given for the
 complainant's property in use for supplying water to
 San Francisco are, in your judgment, the reasonable
 present value of the lands, water rights and structural
 properties of the complainant so in use in such supply?

“A. Yes, I do; considering the size and importance
 of the city which these works supply and protect, and
 considering also the probable future of this city as the
 metropolis of the Pacific Coast, whose development
 has but just begun, and considering the fact that the
 works embrace properties which are capable of supply-
 ing this city for at least fifty years to come, and possibly
 much longer, taking all these facts into consideration,

JAMES D. SCHUYLER (*Continued.*)

and the character of the works, the excellence of their construction, their solidity and substantial character, entitling them to be recognized as the standard of the Pacific Coast in general excellence, considering also the superior qualities of the water, the proximity of the sources of supply to the city as compared with any other available sources adequate to its needs; taking all these facts into consideration, I believe my estimates of the value of the plant to be reasonable and conservative."

"Q. 234. I will ask you if you would have reached a different result on such present value of the plant and properties of the complainant, had you based your conclusions, as to such value of property in use, upon the cost of re-duplicating all structural features and re-acquisitions of land and water right, basing your answer to this question upon your knowledge and experience in the valuation of water properties in this city or on the coast?

"A. I thing that, had my estimates been based on the hypothesis you have stated, namely, on the cost of a re-duplication of the plant at the present day, and a re-acquisition of all the real estate and water rights owned by the company, that my estimate would have been very materially greater than it is."

"Q. 235. I will ask you if you consider that the value of the service rendered at the present time by the plant and property of the complainant in use, justifies the valuation which you have placed upon such property?

"A. Yes, sir, I think it does. A comparison of the water rates in force in this city at the present time with the water rates of other cities of similar character, shows that the rates of San Francisco are lower than those of many other cities that are supplied under more favorable conditions. The City of San Francisco is a prosperous city, it is growing at a rapid rate, and it is quite evident to my mind that the imposition of a higher water rate, sufficient to pay an adequate return upon the estimated valuation, would work no hardship." (pp. 5454-55, Schuyler.)

JAMES D. SCHUYLER (*Continued.*)

On cross-examination Mr. Schuyler testified:

"Even though the Alameda Creek system, including the Calaveras and San Antonio, is capable of producing more water, in addition to the water that is now coming from there, than San Francisco uses at the present time, it cannot be considered as a substitutional system, for the purpose of valuation of the complainant's properties, because it belongs to the complainant, or is assumed to." (p. 5630, Schuyler.)

"The value of the lands and water rights of this corporation should be arrived at, for rate fixing purposes, by a comparison with the cheapest available supply of equal quality." (p. 5630, Schuyler.)

"X. Q. 894. Is it not true that the nearest and cheapest available supply of equal quality is the Alameda system itself developed so as to produce 35,000,000 gallons, or better?

"A. But that is part of the very system that we are making the comparison with."

"X. Q. 895. That does not answer the question: Is it not true that the nearest and cheapest available supply of equal quality is the Alameda system itself developed so as to produce 35,000,000 gallons, or better?

"A. I cannot conceive how it is possible to compare the value of the water rights and lands of the Spring Valley Water Company with anything but a substitutional supply outside of their properties and further away. I have been attempting to arrive at the value of the very properties that are included within the watershed that you are asking me about, and I cannot do that in any other way than to compare them with the cost of a substitutional supply from outside sources." (pp. 5630-31, Schuyler.)

"My estimate may be a very conservative one, much too low; I have endeavored to be conservative in all my figures. Of course, I do not say that every figure I make is an absolutely accurate figure. It is impossible that an estimate can be absolutely accurate in every item, but it can represent what is approximately the

JAMES D. SCHUYLER (*Continued.*)

probable fact. I believe, in this case, the probabilities are that the Pilarcitos pipe line actually did cost more than I have estimated it." (p. 5530, Schuyler.)

e. *Mr. Arthur L. Adams' Valuation.*

Mr. Adams testified: (p. 4725)

"Q. 268. I will ask you to give your opinion as to the present value, speaking, of course, under the stipulation made in this case, with reference to the years 1903 and 1904, and also, with reference to the stipulation made in open court, with regard to the case brought as of the year 1905, of the plant of the Spring Valley Water Company now in use in supplying the city and county of San Francisco and its inhabitants with water?

"A. Having considered the various before enumerated factors influencing in a greater or less degree the question of the value of the properties under consideration, I am of the opinion, first, that in order that the property in question may return to its stockholders current rates of interest upon their investment from its inception it should have a value of \$50,513,723, or, in round numbers, \$50,500,000; second that the actual investment in the existing property, exclusive of losses to stockholders, subsequent to 1880, arising because of an insufficient revenue, but inclusive of \$5,671,000, the cost of establishing the company's business on a paying basis prior to that date, is, in round numbers, about \$35,000,000 or \$36,000,000; third, that the proportions of the estimated cost of a substitutional system, comparable in yielding capacity with the Spring Valley Water Company's water supply properties as now developed and in use, not including the distributing system, is the sum of \$41,500,000, and if to this be added the estimated value of the distributing system, inclusive of the following: (a) city distributing system, \$4,481,700; (b) city reservoirs and tanks, \$680,000; (c) Black Point and Clarendon pumping stations, \$245,615; (d) engineering, administration and legal

ARTHUR L. ADAMS (*Continued.*)

expenses, 7 per cent, and interest during construction, 5 per cent, total 12 per cent, or \$648,878; making a total of these additions of \$6,056,193, the substitutional cost of the plant complete, exclusive of the real estate within the city and exclusive of the Bryant Street shops and buildings and the office building and office equipment at the corner of Stockton and Geary streets, becomes the sum, in round numbers, of \$47,556,000; fourth, that the value of the service rendered limits the value of the property necessary for supplying water at this time, if 5 per cent net is allowed for its use, to about \$40,000,000 or \$45,000,000. Not knowing the value of the company's real estate within the city limits, and of its office building, I am unable to determine the total cost of the complete substitutional system, but it would probably be about \$50,000,000. To place the final valuation, for rate fixing purposes, as low as \$35,000,000 would be to deny to the water company anything more than bare cost of the fulfillment of its plain obligations. To place it at the limit of cost of an independent substitutional system would require an increase of rates probably exceeding the value of the service rendered to the consumer. If the natural increase in values of the properties devoted to the accumulation and conveyance of water to the point of distribution and of real estate used in connection with the distributing system were made to inure equally to the advantage of both supplier and supplied, and if my above assumption leading to the sum of \$50,000,000 as being about the cost of a complete substitutional system, including necessary real estate within the limits of the city and county of San Francisco used in connection with the distribution system is correct, the mean between \$35,000,000 and \$50,000,000 would be \$42,500,000, which, on a basis of 5 per cent net return thereon, after allowing for operating and maintenance expense, taxes, and a suitable provision for depreciation, would not impose rates exceeding the value of the service to the consumer. In view of these various facts I am of the opinion that from \$40,000,000 to

ARTHUR L. ADAMS (*Continued.*)

\$45,000,000 may be taken as the reasonable measure of value for rate fixing purposes at the time in question of the system of water works in use of the Spring Valley Water Company, providing 5 per cent be the net increase allowance thereon.

(P. 4727.) "In reaching these conclusions I have taken up for consideration, each one of the various hereinbefore enumerated factors which I have stated as being, in my judgment, proper to be considered in any final determination of the value of a water works property situated in a manner generally similar to that of the Spring Valley Water Company. The first of these before mentioned inquiries may be formulated as follows: Is the plant of the Spring Valley Water Company of such a character as to enable it to properly fulfil the obligation that it has assumed of supplying the public with a suitable water service, both present and future. I will endeavor to make plain the bearing of this consideration upon the question of value. The relations between the public and the water company are of a mutual character; if the public owes the company a sufficient revenue to maintain and operate its plant and pay to its owners a reasonable return on its value, no less does the water company owe to the public an abundant and good supply of pure potable water; it owes the exercise of such energy, prudence, skill, economy, and capital as will successfully anticipate contingencies of accidents, drought, or increased demand, and such as will at all times enable it to supply water at the least cost practicable to the consumer consistent with justice to its stockholders. Fair treatment and a fair valuation on the one side presupposes the maintenance of an efficient and economical service on the other, and the vice versa is equally true. It is, therefore, proper, that one inquire into the character of the company's plant used and intended for the supplying of San Francisco, and its inhabitants, with water. Such an inquiry naturally falls into the following order: The water supply as already developed, as to quantity and suitability; second, the provision for future increase;

ARTHUR L. ADAMS (*Continued.*)

third, the amount of the present consumption and probable future consumption; fourth, the works for conveyance and distribution, as to their character and suitability for the purpose for which they are intended. To facilitate the examination of the system of works the company's Chief Engineer, Mr. H. Schussler and his assistants, placed at my disposal the records of the engineering department, and have supplied me with very complete data as to rainfall, catchment-areas, net yield realized therefrom, reservoir capacities and elevations, as these pertain to the works of the Spring Valley Water Company; also such plans, profiles and drawings of structures as are in existence, with necessary explanations; all of which, coupled with a personal examination of the property has been sufficient, in my judgment, to warrant the conclusions which I have reached. These matters I have gone over with care, making my own independent computations as to net yielding capacity of the various present sources of supply and contemplated sources of additional supply. I have also carefully estimated the capacities of the various conduits of the company, for the purpose of checking the information supplied me by the company's engineer. From this study and investigation I have reached the conclusions previously given in my evidence as to the entire suitability of the property in question for the giving of the character of service reasonably and properly required of the company both as to the present time and as to the future. My second before-mentioned inquiry relates to the question of the actual cost of the works to the water company. The relation of such an inquiry to the value of the property, for rate fixing purposes, may be stated as follows: cost is seldom determinative of the value of a private commercial enterprise. Such value may be largely influenced by the worth of its business, that is, by the amount of its earning capacity, present and prospective, or by the probable cost of building a new plant of equal or better efficiency, but in the case of a system of water works, devoted by the State to a public use at a rate of com-

ARTHUR L. ADAMS (*Continued.*)

pensation fixed not by the owners but by the municipality that it serves, and so fixed as to yield, as a net return, a rate of interest on the value of the property employed no greater than is earned by securities of a comparative high grade involving little element of risk, the reasonable actual cost of such properties to their owners I believe to represent, in almost all cases, the lowest value upon which a rate schedule can, with any claim to fairness, be based, and though said cost may be by no means determinative of full value I regard it as one of the most important factors and one at least determinative of the minimum value under usual conditions. My reasons for this view are simple, and, I believe, conclusive, because founded upon the practical necessities of water works construction, operation and financial management. They may be enumerated as follows: first, the purveying of water, in a modern city, is a necessity upon which the welfare and very existence of the community depends; this service must, therefore, for the public good, be performed by either private or public initiative regardless of how great may be the necessary cost. Second, when rates are so fixed as to yield only current expense of maintaining the plant in a serviceable condition and pay a current rate of interest on the value of the property such as is earned by securities involving little or no risk, such a policy precludes the company making any financial provision for safe-guarding the investments against possible depreciation by subsequent reductions in the market prices of materials and labor, or otherwise. Third, water works properties of magnitude are never created at one time. They are the product of years of growth, being increased and extended a little at a time, from year to year, in compliance with the demands of the community's growth. In this State water service must largely precede instead of follow population, while the supply must always be maintained in quantity well in advance of present demands. Fourth, the imagining of a system created as at one time at current prices of land, materials and labor is wholly fanciful and has

ARTHUR L. ADAMS (*Continued.*)

never supplied a large city with water, although such an assumption, as we shall see, at times has its use and may have a strong influence upon the final determination of value. Fifth, the final test of accuracy in every estimate is the actual cost of the completed work built as such works are of necessity actually built. Actual cost of the completed work must, therefore, in my judgment, be entitled to greater weight in determining their value than any estimate resulting from unavoidable assumptions of unknown or impossible conditions, and the use of assumptions in lieu of the result of the accomplished fact. Sixth, materials and labor once purchased and used as a part of a system of water works are no longer commodities in the market with value fixed by the rise and fall in prices of new material and labor. At a certain cost these things have already entered into the creation of a system and are devoted to a fixed and permanent use and I cannot quite see why one should adopt as a starting point in the determination of structural values a standard subject to daily and almost unaccountable market variation in preference to the standard that actual accomplishment has unalterably fixed. There appears no good reason for so doing so long as the statements of actual cost are worthy of credence and their reasonableness unimpeached. If, on the other hand, the rate fixing powers have made such liberal provision as to permit of adequate returns upon the property values, the making of ample provision for safeguarding the property against loss through falling prices of materials and labor, or the deterioration of perishable materials, or the abandonments incident to changing conditions, as well as other possible causes of loss, then, the actual cost becomes of lesser importance in determining a just value of the structural works, and corresponding greater weight may attach in the final determination of value to estimated cost of works of duplication or substitutional equivalent without working injustice. In determining the actual cost to a company of its plant recourse must be had to its book record; the reliability of such record can, by a com-

ARTHUR L. ADAMS (*Continued.*)

petent engineer, generally be determined by a study of the property, not with exactness, of course, but within such reasonable limits as is worth while attempting in arriving at a final determination of the present value, involving, as it does, so many broad considerations. An important question, however, relates to the disposition of losses early in the history of the plant, arising from a lack of revenue, and the relation of such losses to the cost of the works and to their value. The correctness of the policy of adding annual deficiencies in the operation of a plant to the investment, in determining the cost of the property to its stockholders, as contrasted with other forms of investments paying current rates of interest is, of course, admissible. That such a course throws any light upon the question of value of the property is not so clear and calls for explanation. In ordinary competitive enterprises such a computation would indicate nothing more than the loss which had been sustained in comparison with more remunerative forms of investment. If, however, as in the case of almost all water works, the enterprise be of a character which does not usually and, therefore, is not expected to yield adequate returns for some years after its inception, making the anticipation of this condition necessary to the successful financing of the enterprise, and its establishment on a firm basis, such early losses may be charged to the investment or cost and become a measure of the money value of that intangible though none the less real asset known as "established business," or, the quality of being a going concern, or, possessing the ability to earn an adequate revenue. With a meritorious enterprise there should, of course, come a time within a reasonable period when the earnings become sufficient to pay a proper return upon the investment, inclusive of such early losses; otherwise the enterprise must be classed as unprofitable and its value be less than its cost. In the case of a water works limited as to its possible earnings, by an extraneous rate fixing body, unnecessarily to a sum less than sufficient to constitute a proper return upon the investment, it appears that

ARTHUR L. ADAMS (*Continued.*)

redress from this condition should be sought in the courts rather than by charging such losses to the investment for a longer period of years. Save in so far, therefore, as these losses may be said to be a measure of the cost of establishing the business they do not of themselves, unsupported by other considerations, constitute a basis of value, and the most that can be claimed for them on their own account is that such losses from lack of revenue during the early history, constitute the cost of and are, therefore, a rational measure of the value of that asset known as established business. Losses from abandoned structures, arising from lack of sufficient revenue for refunding the money thus invested, must be regarded in much the same position as losses from inadequate interest returns from the same cause. Such losses will, however, seldom accrue to the cost of establishing a business, for this should ordinarily be accomplished within the life of all structures of importance. It is true that failure on the part of rate fixing powers to afford this revenue, when it could reasonably be allowed without imposing excessive rates, does a great injustice to a water company which should not be tolerated, but, if such structures are permitted to long pass out of use without enforcing compensation for them they cannot be said to still have value save, possibly, as a claim. By examination of the evidence given by Mr. George W. Reynolds in this case I find that the actual cost to the company of its entire property, to January 1, 1904, inclusive of the proceeds from the sale of stocks and bonds and all unpaid interest, computed at commercial rates coincidentally current with the acquisition of the property, is the sum of \$50,513,723, made up as follows: (a) direct contribution of stockholders, \$9,177,496.82; (b) realized from outstanding bonds, \$15,975,000; (c) the excess of computed interest, at current rates, on the the actual stock investment, over and above the amount actually paid in dividends during the history of the plant, \$25,361,226.16; making a total, as above given, \$50,513,723, omitting the cents. From these figures the follow-

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ing important facts appear: first, for the creation of this property the company has realized, from the sale of bonds, bearing, presumably, the usual low rate of interest which characterize such securities, \$15,975,000; second, the stockholders have contributed about \$9,177,000; third, the revenue, after paying the interest borne by the bonds, and, possibly, a part of the cost of extensions have not paid current rates of interest, such as have been current on commercial loans on the \$9,177,000 paid in by the stockholders by an amount aggregating, when compounded annually, the sum of \$25,361,000. Whether the bonds and stocks have supplied sufficient money to pay the cost of acquiring the property as it is to-day, or whether a part of this \$25,361,000 represents earnings which have gone into extensions to the plant does not appear in Mr. Reynolds' method of determining the total cost. In the proceedings of the Board of Supervisors of the city and county of San Francisco, in the matter of fixing water rates, there appears as an exhibit, a computation showing the total investment up to December 31, 1879, to have been as follows: Expenditures, \$13,168,693; interest unpaid on stock, \$5,671,509; total, \$18,840,202. The annual financial statements of the company, as published in the Municipal Reports, show charged to new construction since that date the sum of \$17,602,003, making the total invested to January 1, 1904, inclusive of unpaid stock interest, prior to December 1, 1879, but exclusive of such interest subsequent thereto, the sum of \$36,442,205. The reasons for this division of unpaid stock interest will follow later; it has an important bearing, as I have already pointed out, upon the question of the value of the asset known as established business. Mr. Reynolds' statements show a total sum realized from the sale of bonds and stocks of \$25,152,497. The difference between this sum and the \$36,442,205 just derived—these figures are not strictly comparable because the bases of computation are not identical in interest rates in these calculations—amounts to \$11,289,708. Of this sum, according to one, \$5,-

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671,509 represents interest on actual investment prior to January 1st, 1880, unpaid for lack of sufficient revenue; the remainder, \$5,618,199, must then represent earnings from the property which have been used for its extension during its entire history. As all net earnings have been distributed to the stockholders since the above date, that is, December 31, 1879, as shown by the company's annual statements filed with the Board of Supervisors, this re-investment of earnings must have been all made prior to that date. The City of San Francisco commenced fixing water rates, under the provisions of the present State Constitution, in 1880. On December 31, 1879, according to said exhibit, the unpaid interest accumulation on the total investment amounted to \$5,671,509. On December 31, 1879, according to Mr. Reynolds' figures, the accumulation of interest on the stock investment unpaid, for lack of revenue, amounted to \$11,828,917, but a large part of this amount doubtless consisted of earnings used for extending the plant, as before indicated. To determine the actual amount of money included in Mr. Reynolds' figures, which has been expended in structures now clearly abandoned, is not easily possible. It can, however, be approximated. In the following list, known to be somewhat incomplete, but embracing the important structures, the first item, entitled "Abandoned work on Locks Creek," I have estimated; the remaining items and amounts have been supplied me by representatives of the water company:

- | | |
|--|-----------|
| 1. Abandoned work on Locks Creek.. | \$252,000 |
| 2. Market Street reservoir..... | 38,602 |
| 3. Lobos Creek works..... | 44,352 |
| 4. Lake Merced pumping station.... | 163,178 |
| 5. Original flume line from Lake Pilar-
citos | 308,676 |

Making a total of\$807,808

"Deducting this sum from the amount of total investment, exclusive of unpaid interest subsequent to

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1879, we have, as the cost of the plant, inclusive of the cost of establishing the business (\$36,442,205, less \$807,808, equalling) \$35,634,397, of which sum the cost of establishing the business, as measured by the deficiency of revenue up to 1880, amounts to \$5,671,509. If we take Mr. Reynolds' figures alone and assume that the stocks and bonds, plus the earnings invested represent the cost of the property, and that the \$11,828,917 represents the latter sum plus the deficiency to the stockholders, in interest up to January 1, 1880, we reach nearly the same sum as by the other method, namely, proceeds from stocks and bonds, less deductions for abandoned structures (\$25,152,497 less \$807,808, equals) \$24,344,689; earnings re-invested, and cost of establishing business, \$11,828,917, making the total \$36,173,606. These figures from Mr. Reynolds, give, of themselves, no indication whether or not any part of the earnings have been re-invested in extensions of the plant since 1879, but the coincidence of the total as derived from said exhibit, plus the new construction account since that date, shows that very little, if any, of the earnings have been so invested since that time. The financial statements of the company also show that since 1880 it has been the established policy of the company to pay for new construction from the proceeds of sales of stocks and bonds, the net earnings being disbursed as dividends to the stockholders. For use later in determining the degree of prudence which has characterized the building of the various water works structures it would have been desirable that the total investment be segregated as to: (a) real estate and water rights; and, (b) structural works. It has been impossible, however, to derive this information with sufficient completeness to warrant the attempt. No attempt has, therefore, been made herein to determine the cost to the company in detail of all its real estate, easements and water right. The probable investment in most of the structures I have determined by estimation, using the schedule of materials and labor prepared by Mr. Schussler and given in evidence, and applying to

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them such cost prices as seem to me proper in view of the manner in which the work has been done. No detail schedules are available as to pumping plants and the submerged pipes. I have been able, therefore, only to deal with these items in a general way in forming an idea of their probable cost. The following is a summary of these estimates:

Pilarcitos system	\$ 907,554
San Andres system	1,146,189
Crystal Spring system	2,682,546
Locks Creek system	300,192
Alameda Creek	2,573,011
Lake Merced system	234,738
City pipe distributing system.....	4,481,716
City reservoirs and tanks	680,049
Pumping plants, (Mr. Schussler's figures of actual cost up to 1901, except for the Burlingame plant, Lake Merced plant and Clarendon Heights plant, where his latest figures, as given in evidence in this case are used because of additions having been made to these later plants subsequent to 1901; these figures are not my own but are here used simply to com- plete the estimate.....	1,335,474
Total	<u>\$14,341,469</u>
To which is to be added for engineering, administration and legal expense, 7 per cent, and for interest during construc- tion, during an equivalent of one year, 5 per cent	1,720,976
Making the total of	<u>\$16,062,445</u>

"If to this sum is added the cost of abandoned structures heretofore given, in round numbers, at \$808,000, the resulting sum is \$16,870,445. I have heretofore pointed out that the total investment in the property, based on said exhibit and the water company's new construction charges, amounts to \$30,770,696. If from

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this latter sum there is deducted the former sum just derived, namely, \$16,870,445, we have, as the amount apparently expended in real estate, water rights, easements, structures not yet brought into use, the building at the corner of Geary and Stockton streets, and any other cost incident to the acquisition of the property as a whole, outside of the schedule given above, the sum of \$13,900,251.

"The before enumerated estimate of the probable cost of the various engineering structures are believed to be substantially correct. The reasons for this belief will be more fully set forth a little later. This brings me to the consideration of the question as to whether or not the acquisition of the present water works property has been characterized by a reasonable degree of prudence and engineering skill. In considering this question in relation to this property it is desirable to ascertain first, whether or not greater prices have been paid for land and water rights than was reasonably necessary; second, whether the structural works have been designed and built on sound engineering lines and with a proper regard for wise economy. Concerning the application of the first no comment is necessary; as to the second it must be remembered that no small part of engineering is the adapting of means to ends, that there are almost no established standards of design, that no two men will ever plan works along identical lines, and that a wide range of liberty of choice must be accorded the engineer. In my judgment the appraiser has a right to expect and demand that the works shall have proven reasonably successful, considering all the conditions which have influenced or controlled their design and construction, with good average practice as his standard rather than his own personal preference. Unqualified failures due to inexcusable ignorance or bad judgment should lead to rejection in determining value. But it should be remembered that engineering is very far from being an exact science, that to some extent it will always be the unexpected that happens, that defects are more easily discoverable under the tests of actual

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trial than prior thereto, and that criticism is far easier than creation. All of the most available water-producing properties anywhere within a radius of many miles of San Francisco not devoted to other uses have been acquired by the Spring Valley Water Company. These properties have been obtained gradually, as opportunities offered, and in advance of the necessity for their immediate use. This policy has, as already pointed out, been essential to the performance of the duty of this company of anticipating the demand for an increased supply and of avoiding extra prices which would have been asked if acquisition were delayed until the properties were imperatively required. By degrees, as the increasing consumption has required, its properties have been developed, commencing generally with the most accessible and the most inexpensive works and gradually extending and adding to them as the necessity arose. Such a policy has been well calculated to enable the company at all times to maintain and guarantee the continuance of an efficient service without heavy investments of capital in developing sources of supply and distributing works at any time greatly in excess of the then prevailing requirements. Such a policy, of course, will always maintain the cost of supplying water to the consumer at a minimum, and, therefore, is prudent and economical. The general conception and gradual development of the plant has been carefully worked out and the structural features are intelligently designed and far more carefully and substantially constructed than is generally the case elsewhere. The works, as a whole, reflect much credit upon their designer and builder. Concerning the real estate and water rights purchased I am advised that no complete record of the prices paid is obtainable, no separate account having been kept by the San Francisco Water Company, nor during the early years of its successor, the Spring Valley Water Works. Neither have I sufficient information concerning the history of these values around San Francisco to form an opinion as to the reasonableness of the prices paid, even if the record were complete. As all

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real estate and water rights are to-day doubtless worth much more than the prices paid for them the question of their exact cost, as will later appear, is not a matter of paramount importance in determining the present value of the property in use as a whole. It appears also that no complete record exists of the exact cost of all the various structural features of the plant, but in the pamphlet prepared by Mr. H. Schussler, the chief engineer of the company, entitled, 'Relating to water rates for the fiscal year 1901-02,' on pages 26 to 32 inclusive, appears an appraisement by him of the value at that time of the various important structural works. In the evidence as given in this case it is stated that these figures were taken from the company's book record of actual cost. In the accounting the cost of structures have not in all cases been kept separate and apart from real estate, water rights, etc. In most cases, however, the result indicates that the accounts have been properly segregated and they constitute a basis from which one can form a very good idea of the character of the management and engineering skill which has characterized the construction of the works as a whole, nearly all of which have been created under the supervision of Mr. Schussler, the present chief engineer. In addition to the above, the book cost of the recent extensive works at Pleasanton, Sunol and along the Alameda Creek below the latter place, appears in the evidence. Without reference to the above statement of actual cost, indeed without the knowledge until later that the said sums, save in the case of the Alameda Creek work, were taken from the company's book record, I made an independent estimate of the probable actual cost of the structural features of the system, with the exception of pumping plants and submerged pipes, no schedules of which have been supplied me, using for this purpose Mr. Schussler's latest schedule of quantities entering into the various structures as given in evidence in this case. The following items in which a comparison is possible will illustrate the relation of my estimates to the amounts stated as actual book cost:

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	My estimates of probable cost.	Book record of cost.
Pilarcitos dam.....	\$ 413,000	\$ 400,000
Pilarcitos pipe line....	494,600	577,000
San Andres system...	1,146,200	1,047,000
Locks Creek system...	300,200	320,000
Recent work on Alame- da Creek system....	717,400	765,200
Totals	\$3,071,400	\$3,109,200
(pp. 4727-4742, Adams.)		

Continuing, Mr. Adams also testified: (p. 4743)

"That this difference averages but 1.2 per cent on so large a number of important structures must, to some extent, be regarded as a coincidence, for such accuracy cannot be claimed for the art of estimating, as is apparent from noticing the wider difference between the separate structures, but it would seem to fully warrant the conclusion that on the whole my estimates of the probable and reasonable cost of all structures would be found not very far from the truth if the exact cost in each case were definitely known. It would also seem to warrant the further conclusion that, as far as information is at hand whereby to form an opinion, the creation of the structural features of the plant has been characterized by reasonable economy, prudence and engineering skill. The next important consideration to which I have given attention in determining the value of the properties of the Spring Valley Water Company in use may be formulated as a query as follows: Has the policy of the rate fixing authorities been such as to make necessary the adoption by the company of any special financial policy in the conduct or acquisition of the water works properties with reference, first, to the refunding of the capital invested in structures of a perishable character or having a usefulness limited as to time; and, second, concerning the acquisition of properties for the future use of an increasing population. My reason for giving consideration to this question and the bearing which it

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has upon the matter of value, are as follows: Depreciation, as ordinarily applied to water works, results either from the wear and tear incident to use and exposure from the elements, or from enforced abandonment, on the score of economy, or of changed conditions; for example of the first, iron pipes are gradually rendered useless by corrosion until renewal becomes necessary; for example of the second, pumping stations may have to be abandoned because the water supply has become of uncertain purity or because of increased consumption or because later and better designed machinery renders the old unsatisfactory, on the score of economy, even though such machinery may still be in as good condition as it ever was. In any event, depreciation represents a shrinkage or diminution of tangible property value, which must be written off to expense as a part of the cost of maintaining the service, and which must be paid for out of the revenues if the capital so invested is to be preserved unimpaired. There are two ways in which this may be done; first, by the establishment of a fund out of which all renewals and losses from abandonments are made good; the said fund being maintained by uniform periodical contributions from the revenues; or, second, by meeting the actual expense of renewals and abandonments each year out of the revenues of the same or succeeding year. Either policy preserves intact the invested capital, and charges depreciation where it belongs, as an item of expense. The former method is for some reasons to be preferred, chiefly because it equalizes this item one year with another, this permitting a more uniform water rate and because it is the practice almost always followed though in an indirect way. For most water works, unless prevented by restrictive legislation, have provision made in their revenue each year for the redemption of a portion of their bonded indebtedness and, under all ordinary conditions, such provision exceeds in amount and renders unnecessary the making of any other provision for depreciation. It scarcely need be pointed out that a policy of making no allowance at all, or of making insufficient allowance

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for depreciation, and then discarding the cost of the structures after abandonment in the determination of value for rate fixing purposes, is nothing less than confiscation which, by a process of gradual absorption, tends to ultimately consume all the capital invested in such structures, with the result of having afforded water service to the consumers at just that much less than cost to the company. The power that fixes the revenue determines the method by which depreciation shall be cared for, if cared for at all. If that power has made possible the provision of no fund for this purpose, but has, on the other hand, established the policy of allowing depreciation only as renewals are actually made, the policy should be pursued to its logical and right conclusion and no structures, when abandoned, be disallowed in whole or in part in determining value until this cost shall have been in the same proportion refunded from the revenue. Structures which have passed out of existence, or which no longer serve a useful purpose, may not be included, whether the matter of their depreciation has in the past been rightfully or wrongfully dealt with. Structures which are still useful should not be depreciated, in determining value, without provision being made in the revenues for refunding their cost. When a charge is properly made against the otherwise value of a property, because of structural depreciation, the amount of that charge should not be greater than the estimated present value of an interest bearing sinking fund which, contributed to annually during the average useful existence of the plant, will equal in amount the investment in the various parts at the end of their usefulness. If it is the duty of a water company to use reasonable diligence to secure for the future as well as for the present an abundant water supply—a proposition seemingly beyond question—and if this can be accomplished most prudently by the acquisition of properties in advance of their actual requirement for the supplying of water it certainly seems that such property before its development is, in the true sense, in use, since it has been purchased for

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and devoted to that purpose in recognition of the company's duty to the public. If it has been the settled policy to include such properties in the determination of the amount of revenue to which a company is entitled in fixing of rates, then, the investor, being relieved from risk and loss of interest in such investments, might, in fairness, well feel that the public had acquired such rights as would warrant his accepting a lower interest return, or its equivalent, on the value of such property after it finally comes into actual use than otherwise; in other words, actual cost would then have greater weight in determining value for rate fixing purposes than the cost of an equivalent property. If, on the other hand, it has been the established policy to exclude all property not actually employed for the supplying of water, in determining value for rate fixing purposes, thus compelling the water company, in the discharge of its duty, to carry such property—it may be for years—at its own risk, then, surely, this original cost has much less weight in determining their value when they do come into actual use—unless, indeed, cost includes also the losses of interest due to their retention—and the cost of other equivalent properties becomes of correspondingly greater importance in determining value. It therefore logically appears that lands and water rights in general which, of necessity, are, in the main, secured and held long periods in advance of actual use should, in the determination of their value after they have been brought into use, have considered their cost, inclusive of loss of interest, and also the cost of acquiring a substitutional equivalent. The latter should establish the maximum and the former the minimum when it is below the latter, provided that the total valuation of the entire water works property thus determined does not exceed the value of the service rendered. Should cost, with interest, prove greater than a substitutional equivalent, it demonstrates imprudence on the part of the water company, for which the consumer should not be held responsible. I have hereinbefore enumerated a considerable number of structures which have served

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their purpose and, for one reason or another have been abandoned, the cost of which represents a large amount of money; and this list may not be complete. This capital is apparently lost for lack of provision for its refunding. There are in the present works three structures whose uses have become so entirely modified from their original purpose by the changes incident to the growth and extension of the works that it has been questioned whether they are longer entitled to be considered as in use for the supplying of water. One is the diverting dam at Niles, including also a masonry and iron conduit leading to a connection with the conduit from Sunol; the second is the upper Crystal Springs dam and the third is the upper Pilarcitos dam. All still serve useful purposes; the former as an auxiliary for the diversion of about 13,000,000 gallons daily, in the event of accident to the works diverting at Sunol, and also for the constant delivery of a certain amount of water to riparian owners, which has been a part of the consideration in the acquisition by the company of certain water rights. The Crystal Springs dam, as I have already pointed out in my evidence is useful for clarification of the water by sedimentation after storms, as a crossing for a county road and in securing safety to at least a part of the water of the lake should accidents to the lower dam render necessary the drawing off of the waters of the lower Crystal Springs reservoir; the upper Pilarcitos dam, in a lesser way, answers much the same purpose as that of the upper Crystal Springs, save for there being no road and no provision for the conservation of water. These are all important uses, but not so important as the original use which first cause their construction. There is no reason to question the propriety of the construction of either. Even the upper Crystal Springs dam, during the years that its construction made possible the postponement of the greater expenditures for the lower works, has saved in interest account far more than its cost, a saving which has inured to the benefit of the rate payer. For reasons which I believe I have made plain these structures

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should, therefore, not be depreciated in determining value without provision being made in the revenues for refunding the amount of such depreciation. The extracts from Mr. Reynolds' testimony, which I have heretofore given, make clear that it has been the fixed policy of the rate fixing authorities to make no allowance or provision in the revenues for depreciation of any character, while the company's financial statements, since 1880, show that all net earnings have been distributed by it as dividends to its stockholders, without provision for depreciation. Under such conditions the loss of capital thus invested has been imposed upon the water company. Were the present rate payers the ones who had profited thereby, justice would seem to demand the return of this capital by the imposing of a higher water rate for that purpose, but such being not the case it seems clear that any desired redress should have been sought at an earlier date. In my appraisal, therefore, I have made no inclusion of properties which, through abandonment, have passed out of use, nor, on the other hand, have I depreciated any properties still serving a useful purpose, even though their present use has widely departed from that for which they were originally constructed.

"My next inquiry in determining the value of the works of the Spring Valley Water Company is: Would the re-duplication of the existing structural works cost less or more than the present structural works have cost? My reasons for making this inquiry are as follows: Previously in my evidence I have pointed out the grave objections to adopting this theory as the sole or even paramount consideration in the determination of value of existing structures when they are sought to be valued simply as structures separately and independently of their relation to the system as a whole; nevertheless, it is proper to make this inquiry even though the actual cost of the existing structures may be known with certainty, for the answers will usually be serviceable in determining the degree of prudence and economic skill which has been exercised in the construction of the

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works; in other words, the answer to the query goes rather to the question of prudence in the expenditures actually made than to the value of the structural works in question. This is particularly true where the rate-fixing authorities have pursued the policy of not allowing a revenue sufficient for safeguarding the actual investment in structures against subsequent falling prices and corresponding lesser cost of their re-duplication at a later date. Works of the magnitude here considered never are and cannot be constructed as of any particular date or any particular year. In determining, therefore, the probable cost of re-duplication it is necessary to forecast the prices of materials and labor likely to prevail at least during such period of time as would be necessary to carry out the assumed programme. To make such a forecast one cannot usually do better than to judge the future by the past and assume as a basis the general average of conditions which have prevailed for a period of years. Considerable prior study of this subject has led to the conviction that while single items of cost have in many instances fluctuated materially, yet the sum total of the cost of building works in California, whose construction has extended over a period of the past 25 or 40 years, is not materially different from that which would result from the application of the prices of materials and labor generally prevailing since 1899 and which, save for causes likely in most cases to prove ephemeral, are still on the average not much changed.

(P. 4750.) "I am therefore of the opinion that the probable cost of re-duplicating the present structural works after the manner in which they have been built would not be materially different from their actual cost as hereinbefore estimated by me. My next important consideration in determining the value of the property in question is: Would the construction of substitutional works cost less or more than the present plant has cost? The relation of this inquiry to the determination of value I shall now endeavor to make plain. The estimated cost of construction of independent substitutional

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works has, for reasons already fully set forth, little relation to the actual value of existing structures, save as such studies may throw light upon the question of the wisdom of the adopted plans after which the works had been built. Unless such estimates can prove the existence of gross and inexcusable error in the adopted plans, they are not entitled to great weight in determining the value of existing structures. In determining the value, however, of any combination of real estate and water rights which have together been made a source of water supply, for which there exists a demand, the estimated cost of creating an equivalent from the next most available source becomes at least one measure within limits of the present value of the properties and rights already acquired and in use. This proposition rests upon the theory that since such enhancement of value, due to the general community growth and prosperity, to which a water company largely contributes, is, in the case of individuals of private enterprises, always regarded as legitimate gain, there seems absolutely no reason why the properties of a public corporation devoted, by process of law, to the public use for more than a fair annual return upon its value, should not share in such enhancement. I have pointed out that this consideration is entitled to special weight in determining the value of water properties when companies are compelled to carry them at their own risk and expense until such time as they are actually required for use. The cost of a substitutional system of water supply is best determined in this instance by a study of the projected new and independent system of works proposed for San Francisco. This project is the final consummation of an elaborate study of various possible sources of supply which has extended over many years and in it the Tuolumne River is adopted as the source, and Hetch Hetchy Valley and Lake Eleanor as the places of storage. The enterprise has been fully described in the report of past city engineer C. E. Grunsky to the Board of Public Works, under date of July 28, 1903. I have already in my evidence made a criticism of these proposed works and

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given my estimates of the probable cost of their construction, so that it is unnecessary for me to repeat it here.

"The next question to which I have given consideration in the determination of the value of this property is: Have the real estate and water rights and privileges of the company increased in value since their acquisition? It seems clear that any determination of present value, if cost be used as the starting-point, should be influenced by the appreciation, if any, that has taken place in real estate, water rights and such like properties since their acquisition by the owners of the works.

"It not infrequently happens, especially in the semi-arid sections of the country, that water rights and privileges and real estate so situated as to afford natural opportunities for affording run-off and storage facilities of an exceptional character, though secured at comparatively small expense, through increased demand due to increase in population become in time of greatly enhanced value.

"Inasmuch as such enhancement of values is always regarded in the case of private enterprise as legitimate gain, and particularly since general prosperity, which creates such enhancement, is largely fostered by a system of water works as by any other agency, there seems no valid reason why such increase of value above original cost should not accrue within limits to the advantage of the water company.

"The actual determination of the present value of such assets must of course take into account the general scheme of which they form integral parts, and the final result as a whole, to which they contribute. No piece of real property, however difficult it be to find a satisfactory measure of its value, is ordinarily counted as worth less than the cost of other as favorably situated tracts. If this principle is applied to the combination of properties which because of their having been brought together has made possible the delivery for perhaps all time, of a suitable volume of potable water, then logically the amount of increase in value of such property

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or its present value would be sought in the cost of developing or otherwise obtaining an equally abundant and equally marketable supply from the next most available source. This is the justification for using the probable cost of a substitutional equivalent as at least strongly indicative of present value. This method has its chief application and will most affect the final result in the case of those properties used for gathering, storing and safeguarding the sources of water supply as distinct from the distributing system in those regions of the West where the water supply is the great problem. On the other hand, where the community has at hand inexhaustible sources of supply free to anyone at the cost of taking, water rights may have no value and no increase in excess of cost than becomes ordinarily possible. As I have previously pointed out, it has not been possible to ascertain the actual cost to the company of the various tracts of land, water rights and privileges possessed by it. By the method of ascertaining the probable cost of structural works, and deducting this sum from the total investment as determined by Mr. Reynolds, it has been shown that the sum total, of which these items presumably represent by far the larger part, has amounted without any unpaid interest allowance to the sum of \$13,756,696. This amount, however, includes the acquirement of properties capable when fully developed of producing in excess of 90,000,000 gallons daily. It being impossible, therefore, to determine the cost, it is equally impossible to determine the extent of their increase in value; but this does not preclude the determination of their present value, nor the reasonable present value for rate-fixing purposes of the entire property. Whatever may have been their cost, it appears from the great cost at present of securing an equivalent, as I have heretofore pointed out, their present value must be in excess of their actual cost, either exclusive or inclusive of the interest losses incident to the necessity for carrying them until they came into use. Just what this value is, is intimately allied with the question of the value of the service rendered to the con-

ARTHUR L. ADAMS (*Continued.*)

sumer, a question which I will hereafter discuss. The next line of inquiry in determining the value of the property in question relates to the value of the franchise. My reasons for considering this matter are as follows: If a concern is actually earning revenue in excess of an amount sufficient to meet all cost of production, including a proper return upon the value of the property employed, it has become a very common practice to credit such surplus earnings to franchise. It cannot be denied that under such conditions, by whatever name it may be called, this ability to earn a large surplus, when it may be exercised, constitutes an important element of value. It appears, however, that the creation of an earning power directly attributable to franchise under this definition, and the consequent creation for it of real value where it has cost nothing, presupposes the entire absence of regulation of rates on the part of the government for the purpose of securing water service at no greater cost to the consumers than is consistent with fairness to the water company. In other words, franchise if it has cost nothing is not necessarily an element of value upon which any revenue need in fairness be allowed by rate-fixing authorities. Indeed the very purpose of the law apparently is to prevent such excess earnings as are here assumed to give value to the franchise. If on the other hand there are no legal restrictions, and a water company is allowed to collect such rates as seems to it alone expedient, it may easily be imagined that its earnings might in many cases be greatly in excess of what would net it a very reasonable or even liberal return upon the otherwise value of its property, no matter by what rational method such value were determined. Again, when water companies have by wise foresight and prudent expenditure acquired properties, such for instance as lands and water rights which by reason of their especial adaptation to their purpose cannot be dispensed with without securing other properties productive of equivalent results at a cost materially in excess of the investment actually made, such enhancements of value have sometimes been cred-

ARTHUR L. ADAMS (*Continued.*)

ited to franchise. This element of value I have already pointed out to be a real asset, but it stands in a class by itself. To term it franchise seems a misnomer, since it represents real value wholly independent of the franchise. Again, the fact that a property possessed of and actually doing a large business capable of affording a sufficient revenue is worth more than a similar property without such business, has sometimes been termed franchise value. This too, while doubtless a real asset, is better classed as 'established business,' and will later be again referred to. I am therefore of the opinion that the first before-mentioned view of what constitutes franchise value is the correct one; that every other element of real value is more properly classified otherwise and that under the system of regulation of rates by the State no value need attach to franchise either for purposes of taxation or revenue.

"The next consideration to which I have given attention in the determination of the value of the property of the Spring Valley Water Company concerns the asset usually termed 'established business.' I have already heretofore pointed out that a system of works already possessed of a sufficient business to make the property a profitable investment is worth more than a similar property without a revenue. That an established business constitutes a very real asset would seem to be beyond dispute but the money measure of its value is so difficult of determination that it has at times compelled resort to mere arbitrary opinion. Such a procedure is, however, to be avoided if a logical standard can be found. It does not appear that such a standard is wanting where proper accounting has been employed, and its reasonableness lies in the fact that it is rooted in the necessities of water works construction and growth as demonstrated by general experience. This measure is found in the actual cost of establishing the business as ascertained by the losses during the early history of the plant arising from the want of a sufficient revenue to pay at least current rates of interest on the necessary investments. I have already made brief men-

ARTHUR L. ADAMS (*Continued.*)

tion of this subject, but it is worthy a little further amplification at the risk of some repetition. The building of water works suited to prevailing needs with liberal allowance for future increase, is a work of necessity for any modern city, a work which, especially in the regions of sparse rainfall, must after the first nucleus is formed precede rather than follow growth in population. A suitable water service must be obtained regardless of the magnitude of the necessary cost. Because of these facts it almost invariably happens, where local conditions render necessary heavy initial capital outlays, that to some extent the future must be discounted in the early financing of the enterprise. In other words, the limited number of rate-payers makes it impossible for the enterprise to pay adequate returns on the investments until the population and business industry, increasing under the stimulus of an abundant water supply and other causes, make possible an adequate revenue. What is to be the return for this unavoidable additional source of expenditure in the establishing of a sufficient business? Its result is the creation of this asset known as 'established business,' and the attendant expense is an actual measure of what it has cost to create it by the only means by which such an element of water works value can be created. Cost is therefore a rational measure of the value of this element 'established business.' It appears that this sum of unpaid interest accumulation on investments prior to January 1, 1880, amounted to \$5,671,509.

(p. 4757) "My understanding that this amount really represents the accumulation up to that time when the water rates were first fixed by the Board of Supervisors under the provisions of the present State Constitution, and when according to Mr. Reynolds' table the revenues were nearly sufficient to pay current rates of interest on the stockholders' investments. This seems to be the most logical and rational valuation of the element usually known as established business.

"The final question to which I have given attention in the determination of the value of the property in

ARTHUR L. ADAMS (*Continued.*)

question is, 'Does the value of the service rendered to the public limit the value of the property?' This question has an important bearing for reasons which I shall set forth. The value of an established water works no matter how great may have been its cost nor how great a sum would be required to secure a substantial equivalent, can not in the final analysis be more for rate fixing purposes than the capitalization of its greatest possible net earnings, without restriction as to charges; in other words the worth of the service to the consumers will always fix a maximum beyond which no theory of value, however reasonable it may otherwise appear can be followed. In the following way, the worth of the service to the consumer and the limitation which it imposes upon value may be demonstrated; first, the service is not worth more to any consumer than it will cost him individually to secure an equivalent by pumping out of a well or from some other available source, if there be any, for if the rate charged exceeds this amount, so many will utilize such source in preference that the revenue of a water company might be seriously reduced. The same holds good for all consumers collectively save that in such capacity they may be expected to act with due regard to the public welfare as well as that of the individual. Second: if there is no other possible substitutional supply, thus placing the water company in the position of having an absolute monopoly, still the value of the service rendered cannot be worth more than the consumer can afford to pay interest upon, without impairing general prosperity and without checking municipal growth. To illustrate the above propositions: If a water company were wholly unrestricted by any governmental agency in determining the amount of its charges, it would be folly for it to impose rates so high, no matter how great its necessary investment, as to invite destructive competition or cause a large proportion of its patrons to use wells in preference, and if no competition were possible, or wells available, it would be just as foolish for it to injure its present as well as its future business

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by imposing rates so high as to check general prosperity and retard municipal growth. A wise policy and the one calculated to derive in the long run the greatest possible returns would always seek to keep well within these limits; and keeping within these limits, the property could not, for rate fixing, have a greater value than the revenue then received could support by a suitable interest rate. If the investment of a water company should prove in the long run, greater than the value thus justified by the permissible rates, the loss is chargeable to bad judgment on the part of the investors. When one attempts an inquiry as to the value of the service rendered in any specific case he finds himself, however, without any positive standards. Water rates charged in different places are indicative of general practice, but each is determined by widely different local conditions and none may answer the question directly as to what is the maximum revenue that those local conditions would if necessary warrant. If, however, the rates in question are ascertained by comparison to be materially less than have been successfully imposed without evil results in other cities of comparable wealth and general prosperity, it may be inferred that the application of similar rates would in the case in hand be a safe procedure. Again, if property, improved and unimproved, is enhancing rapidly in value, it is evident that the imposing, if need be, upon it of an increased cost of water service would accomplish no worse result than to divide the so-called unearned increment, due to general increase in population in some proportion between water works and real property. This phase of the subject then deals with the total gross revenues which the company should be allowed to collect wholly regardless of the magnitude of its actual investment. Its application therefore requires the study of the rate of general taxation as well as that imposed upon the company, the amount of revenue paid the company in compensation for public service, the cost to the company of operating and maintaining its works, the provision, if any, which should be made annually for liquidating investments in

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structures which ultimately require abandonment and the rate of interest which the property is entitled to earn over and above all expenses. While only general conclusions can be drawn from so complex a study they can with the exercise of care be made sufficient to establish the limitations sought with a degree of accuracy suited to the demands of substantial justice. Because of the local conditions about San Francisco requiring large investments and because of the great cost of securing an equivalent water supply from other sources, water service in San Francisco must be expected to cost as much or more than in any other large city in the United States; and again, because of the large necessary investment it might not be practicable to earn so high a rate of interest as otherwise, since the value of the service might not permit it. The present water rates charged by the Spring Valley Water Company, as I shall soon show, are exceeded—at least for domestic consumption—in many cities where the natural conditions are far more advantageous for securing water service at less cost, than in San Francisco. Property values in San Francisco have as a matter of common knowledge greatly enhanced especially in recent years and are still increasing with the prevailing rapid growth in population and continuance of general prosperity. It is therefore evident; first, that the revenue derived from the present schedule of rates charged to the private consumer does not approach the limit which it would be easily practicable for consumers to pay. Second; that the contribution to the support of the water works through general taxation is not such as retards the rapid advancement of real property values. Third; that the said rates might, if need be, be materially advanced without doing any violence to a sound public policy. Fourth; that the value of the service to the consumer therefore does not preclude an advance of rates either public or private or both.” (pp. 4743-4760, Adams.)

(p. 4765) “The statement of revenue and expense of the Spring Valley Water Company during 1904, as it appears in the Company’s sworn statement filed with the Board of Supervisors, is as follows:

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REVENUE:

From private rate payers. . .	\$1,879,882	
From City and County. . . .	93,104	
From water rents of shipping	97,778	
From other sources	141,538	\$2,212,302

DISBURSEMENTS:

For operating expenses. . . . \$	554,862	
For taxes	365,496	920,358

Balance available for interest, dividends
and depreciation fund, if any. \$1,291,944

"In these figures the very small amount received from the City and County is strikingly noticeable. It might well be several times as great. Indeed, it is but 40 per cent of what was received from this same source as far back as 1897, according to the Municipal Reports. The operating expense represents 2.2 per cent of the actual investment in the plant, which, exclusive of any unpaid interest to stockholders and exclusive of earnings turned into investment is, according to Mr. Reynolds' evidence \$25,152,497. This expense for operation compares very favorably with general practice. The assessing of so large a sum against the company for taxes, and the cutting down of the amount paid by the municipality for public uses of water has the effect of imposing upon the private rate payer not only the entire cost of sustaining the plant, but in addition requiring him indirectly to contribute to the general tax fund under the guise of water tax, a large amount of money. In the year 1904, the Company paid in taxes, as I have indicated, \$365,496 and received in payment for water supplied for public uses \$93,104, showing an excess paid in taxes over that received for water used for public purposes \$175,392. In other words, property that year not only contributed nothing for the benefits it derives from fire protection and water consumed for public uses, but the rate payers, in addition to carrying the entire water system, were in-

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directly taxed through their water bills for general purposes, the sum of \$175,392. From the before stated comparison of rates charged in other cities, and this analysis of the Company's present revenue and expense it is evident that by a proper distribution of the cost between private rate payers and public taxation and by advance of the rates along carefully considered lines, the amount of the Company's gross revenue could be increased 40 per cent to 50 per cent if need be, without exceeding any reasonable limitation imposed by the value of the service to the consumer.

"If 40 per cent advance were made the net revenue after deducting for operation and taxes, would be:

"(\$3,097,000—\$920,000) \$2,177,000

"If deduction of 1 per cent of an investment of \$25,152,000 as a contribution to a renewal and abandonment fund is made amounting to 251,500

there would remain a net profit of.... 1,925,000

or 5 per cent on capitalization of.....\$38,510,000

"If 50 per cent advance were made in the rates, these latter figures become, on 5 per cent basis of capitalization.....\$44,690,000

"An increase of rates up to these limits would apparently be within the realm of precedent and reasonably certain forecast as to probable consequence, but there is room for grave doubt as to the propriety of imposing a still higher rate. The value of the service therefore, at this time, in my judgment, limits the value of the works to a sum not exceeding \$45,000,000 if 5 per cent net interest is allowed.

"I have now set forth in some detail the various facts which I have considered in reaching a conclusion as to the value of the water works of the Spring Valley Water Company now in use, and my reasons for considering these questions. I shall now summarize the results of my inquiry as a whole. First, I conclude

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that the plant of the Spring Valley Company is of such a character as to enable it to properly fulfil its obligation to supply San Francisco and its inhabitants with a suitable water service both present and future. Second: that the cost of the works to the company to January 1st, 1904, has been, according to Mr. Reynolds' evidence, inclusive of the proceeds from sale of stocks and bonds and all unpaid interest computed at rates current for commercial loans to January 1st, 1904, the sum of \$50,513,723. According to the said exhibit first mentioned, the actual investment of funds derived from sale of stocks and bonds, and from the earnings prior to January 1st, 1880, plus the company's charges to new construction account since the above date, less the cost of abandoned structures and not inclusive of any deficiencies in interest return to stockholders, the cost of the works has been the sum of \$29,962,888. Add to this latter sum the cost of establishing the business as measured by the deficiency of returns to the stockholders prior to 1880 as determined by said exhibit, \$5,671,509, the resulting cost of the works is \$35,634,397. Including the actual investment as determined from the proceeds from sale of stocks and bonds, less the cost of abandoned structures, plus earnings re-invested prior to 1880, plus the deficiency in returns to stockholders up to 1880 arising from lack of sufficient revenue (here used as the measure of cost of establishing the business), all as determined from Mr. Reynolds' figures, the cost of the works is \$36,173,606. My estimated original cost of the structural features alone of the plant now in use is \$16,062,000. Third: the structural features of the Spring Valley Water Company's plant, have, I believe been acquired with reasonable economy and prudence, and the works as a whole evince engineering skill of a high order. Fourth: the policy of the rate fixing authorities in making no provision for renewals or abandonments has not permitted the refunding of such items of expense either by the maintenance of a sinking fund or by securing in the revenues from year to year the sums necessary for this purpose; and has therefore sub-

ARTHUR L. ADAMS (*Continued.*)

jected the company to the loss of capital so invested. The policy of the rate fixing authorities has been, apparently, to make no allowance in the revenues for returns upon property not already in use for supplying water to San Francisco, thereby making it incumbent upon the water company in the discharge of its duty to procure and carry on its own account and at its own risk all properties required for future use until such time as they are actually employed in supplying water. Under such circumstances original cost of such properties is entitled to little weight in determining their present value—unless indeed the losses of interest at a liberal rate incurred by the operation be added to the original purchase price—and the cost of other equivalent properties becomes of corresponding greater importance in determining their present value. Fifth: the probable cost of reduplicating during a period of years the present structural works after the manner in which they have been built would probably not on the whole materially differ from their actual cost as hereinbefore estimated. Sixth: the cost of a substitutional supply exclusive of the distributing system would cost not less than \$44,523,000 and the proportion of this amount comparable with the present developed 35,000,000 gallons daily supply of the Spring Valley Water Company, is \$41,500,000. Seventh: the real estate and water rights properties of the Spring Valley Water Company have greatly increased in value, by an amount not directly ascertainable nor necessary of ascertainment in valuing the property as a whole. Eighth: the franchise I do not regard as having value save as it is included in the element of established business or in the cost of a substitutional water supply. Ninth: special value does not attach to the element of established business, and the cost of its creation, \$5,671,509, may be taken as the measure of its value. Tenth: the value of the service rendered to the rate-payers in my judgment limits the value of the property to a sum not exceeding \$45,000,000 on the basis of five per cent net return on that sum. In the answer to the question just

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preceding the one to which I have been replying I gave my final summary of conclusions concerning the value of the property." (pp. 4765-69, Adams.)

Mr. Adams also testified: (p. 4773)

"Q. 281. Now, I will ask you if you have made any investigation showing the relation between investment and operating expense, exclusive of general depreciation and taxation for works reported by the United States Commissioner of Labor as having an investment in excess of \$5,000,000?

"A. I have.

"Q. 282. Would you give that table?

"A. I have made a study of the report which you refer to and from it have extracted the information to which you refer. I have prepared it in tabular form, a copy of which I herewith hand you."

TABLE SHOWING RATIO OF OPERATING EXPENSES TO INVESTMENT IN SIXTEEN CITIES.

1	2	3	4	5	6
Listed No.	Municipal or private.	Total Investment.	Cost of operation omitting taxes and depreciation.	Ratio of operation expense to investment, in percentage.	Same as Col. 5 with omission of fuel cost.
1005	M.	\$ 7,100,000	\$ 122,026	1.7 per cent	1.7 per cent
1009	M.	6,362,000	86,431	1.4 "	1.2 "
1012	P.	5,811,000	153,455	2.6 "	2.0 "
1021	P.	16,575,000	388,364	2.3 "	2.1 "
1023	M.	5,901,000	118,610	2.2 "	1.7 "
1024	M.	10,428,000	550,508	5.3 "	4.5 "
1025	M.	6,678,000	240,210	3.6 "	2.3 "
1026	M.	8,033,000	279,549	3.5 "	3.0 "
1027	M.	14,916,000	334,255	2.7 "	2.2 "
1028	M.	13,920,000	423,864	3.0 "	2.8 "
1029	M.	28,938,000	904,014	3.1 "	3.0 "
1030	M.	8,740,000	273,996	3.1 "	2.5 "
1031	M.	24,400,000	1,071,808	4.4 "	3.6 "
1032	M.	86,236,000	722,827	0.8 "	0.8 "
1033	M.	34,472,000	1,348,000	3.9 "	2.9 "
1034	M.	27,354,000	961,674	3.5 "	3.2 "
				2.9 "	2.6 "
Average of works costing over \$10,000,000...				3.2 "	2.8 "

ARTHUR L. ADAMS (*Continued.*)

"Q. 283. According to that table and the operating expenses of the Spring Valley Water Works as shown by the records, how do those operating expenses compare with other investments in public utility corporations?"

"A. Very favorably. The Spring Valley rate being 2.2 per cent, whereas the table covering all of the water works included in the Commissioner's report having an investment in excess of \$5,000,000, that is, embracing 16 different plants of which 14 are owned by the municipality and two by private companies, shows an average operating expense of 2.9 per cent, while, if we make the comparison with works costing over \$10,000,000, we find that the statistical table shows an average operating expense of 3.2 per cent against 2.2 per cent on the part of the Spring Valley."

"Q. 285. Tell me the relative weights which you have attached to each of these factors in reaching your final conclusions?"

"A. After having satisfied myself as to the entire fitness of the Spring Valley Water Company's works to supply the city of San Francisco and its inhabitants with water, both at present and for the future, my final conclusion has been influenced, first in importance, by the cost of securing an equivalent water supply from the most available source which the city of San Francisco, after many years of study, has been able to find; second in order of weight, my conclusion has been influenced by the limitation on value which the worth of the service to the consumer in my judgment imposes; third, and of lesser importance in this particular case, the cost of the works to the company, whatever method be employed in the determination of this cost. This latter consideration is in this instance chiefly valuable in determining the value of the distributing works. The great increase in the value of the company's real estate, water rights and structures, going to constitute, as a whole, works for gathering, conserving, protecting and the conducting of its water supply to the point of distribution as determined by a comparison with the cost of a substitutional system, or a system of reduplication, hav-

ARTHUR L. ADAMS (*Continued.*)

ing largely overshadowed the importance which, under other circumstances, would attach to the question of the company's actual investments or the cost of its properties."

"Q. 286. On the supposition that you had been in the possession of no information in relation to the company's actual investments for properties in use, or the book cost of its properties in use, would your conclusion as to the value of such properties, in view of all other circumstances, have been different from that which you have given?

"A. No, I think not. The two paramount considerations would still have remained. But without knowledge of the comparative meagre returns which the company has in the past received upon its property in the fixing of rates, I should have felt less confidence in the fairness of my conclusions."

"Q. 287. Now, I will ask you if you would have reached a different result on such present value of the plant of the Spring Valley Water Company had you based your conclusions as to the value of that property in use upon the cost of reduplicating all structural features and adding thereto the present values of real estate, water rights and water properties, instead of using the substitutional system?

"A. No, I should have reached the same conclusion because had I determined the substitutional cost of all structural features and then added thereto the present value of all real estate, water rights, etc., necessary to complete the entire system in use as it is to-day, the determination of the value of real estate, water rights, etc., could only be ascertained by a comparison with the cost of a substitutional equivalent. The resulting total valuations, therefore, had that theory been used, would have been the same."

"Q. 288. If no similar properties exist in similar localities adapted to the use of a water supply upon which to base an estimate of the value of the properties in use, then, what would you take as a basis of their valuation?

ARTHUR L. ADAMS (*Continued.*)

"A. The value of the service rendered to the consumer in that becomes the sole consideration." (pp. 4773-78, Adams.)

5. THEORY AND PRACTICE OF THE CITY ADMINISTRATION AS TO VALUES.

Mr. Grunsky, acting for the city, gave it as his theory that in fixing values, "the policy should always, under such circumstances be, to compensate the person liberally who, by business foresight, judicious investment, or perhaps by accident, has acquired possession or brought under his control the water which has become a public necessity and which has been made or is to be made a public use." (Grunsky's test. p. 333.)

Yet the engineer, when he comes to value the Alameda Creek properties, testified: (p. 344.)

"X. Q. 94. Did you estimate the Alameda Creek system on precisely the same basis and upon the same principles as you estimated the Peninsula system?

"A. No, sir. . . . On the Alameda system *cost* is substantially the basis of the estimate."

Again, at page 179:

The theory is:

"The Water Company should be allowed a reasonable return upon its investment. *Depreciation* resulting from deterioration of the plant, or from other causes, should be taken into account in some way. It may be taken into account by estimating reduction in value of the perishable portions of the plant and paying to the company annually the sum of money representing this depreciation. . . . Depreciation may, however, be fully covered by assuming the works to remain at their full value so long as they render efficient service, and apply-

ing the interest rate to such valuation, which will, as a matter of fact, be in excess of value as determined under the other system."

The practice was:

The same learned engineer, notwithstanding the fact that there never has been any annual depreciation allowed, notwithstanding the fact that the dividends paid by plaintiff have always been less than the current rate of interest, eliminates from the appraisalment of properties *all property* which had become depreciated through development of the plant (p. 412) notably:

Portola reservoir and lands.....	\$390,480
Lands tributary to Upper Lock's Creek line	71,580
Upper Crystal Springs dam.....	265,000
Value of lands in Calaveras reservoir site for reservoir purposes.....	323,700
Point Lobos lands and pumps.....	80,000

Again, at page 422 he was asked the question:

"X. Q. 556. Do you believe it is proper to add any percentage in view of the uncertainty of adequate returns and the risks and responsibilities assumed by the Spring Valley Water Works in establishing and maintaining its works?

"A. I do in this sense, that some of the properties depreciate in value by going out of use, and that ought to be taken into account."

Yet, nowhere is this item taken into account by the Board of Supervisors.

Again he testified: (p. 393)

"X. Q. 415. Under that opinion is it not an essential requisite on the part of the Spring Valley Water Company to have on hand properties capable of development to delivery of 60,000,000 gallons per day?

"A. It certainly is a desirable thing for them to have in view an extension of their works, but this was written (a portion of the report referred to in the question) in connection with the bringing of water from the Sierra Nevada mountains, and when the system is expanded to this extent it should be expanded by bringing into the city the best water that is obtainable. And, of course, this statement was made with the particular view and with particular reference to the bringing in of an additional supply from the Sierra Nevada mountains."

"X. Q. 420. How much would you reduce that quantum of 60,000,000 gallons per day if you applied that principle to a private corporation engaged in the supply of a city instead of applying it to the municipality itself, in reference to the amount it should have on hand by an established system?"

"A. I would not endeavor to reduce it. I think that that depends upon the individual sources that are available, and the amount of water that can be produced from them, and the order in which they would be added to the established system."

"X. Q. 421. That being the case ought not water producing properties, to the extent of 60,000,000 gallons a day, that is to say, the excess over present consumption up to 60,000,000 gallons per day, be allowed to the corporation as a part of its assets upon which it should receive interest?"

"A. Not necessarily, because as these properties are acquired and come into use they will be allowed in any valuation placed upon the works, and full justice will be done the company by making the valuation as of the time when they do come into use."

"X. Q. 422. The valuation of the property at that date, do you mean, or the cost plus interest and taxes?"

"A. A reasonable cost plus interest and taxes would be my preferred way of valuing."

That is the *theory*, but the practice is, that nowhere either by the engineer of the Board of Public Works or the Board of Supervisors, has the valuation of any

property been thus allowed at cost plus interest and taxes. The Alameda system was bought twenty years ago for the special purpose of taking care of San Francisco's present needs; without it there would have been two droughts in the last two decades. (pp. 180-1.)

When all properties are being used to supply San Francisco—say in 1950 when the consumption will be 100,000,000 to 110,000,000 gallons per day, it will supply $\frac{4}{5}$ of the water used. (p. 638) This very engineer estimated it at *primal cost alone*, merely because the water was not actually produced in quantities of over 10,000,000 gallons per day prior to 1903.

The only reason it did not produce from 15,000,000 to 16,800,000 gallons in 1902 was because of absence of pipes and other appliances to gather and conduct the water to San Francisco. The property itself produced the water, but because of absence of appliances it ran to waste in the bay.

The Calaveras and San Antonio reservoir sites, which are the means whereby San Francisco is going to live when the 35,000,000 gallon limit is reached, was appraised by this engineer as follows: (p. 392)

"X. Q. 410. The San Antonio reservoir site, is that included in that list?

"A. It is not included in this list as property not in use. It was allowed for in the appraisalment at the cost to the Water Company."

"X. Q. 412. At the cost to the Water Company but not as a reservoir site?

"A. In the appraisalment of these properties whether as reservoir sites or water rights the appraisalment is of the properties as purchased by the Company, and, in this case, it was entered in the appraisalment *at cost*."

The Spring Valley Water Company bought the Alameda properties in the early '80's. They bought them as farming land, slowly and gradually. They used (as Mr. Grunsky aptly phrases it) "business foresight" and made judicious investments in the Vallejo dam and in about 1400 acres of filter bed, which, together with the 600 square miles of drainage area, the controlling portion of which complainant bought at farming prices, has become the "cornerstone of the foundation" of San Francisco's hope for water for the next two decades. The *theory* of the engineer is, that these properties when they become actual water-producing properties, should be given a value to compensate for this business foresight and judicious investment.

The *practice* of the city administration is, to give these properties values only at actual cost as farming lands.

This 1400 acres of gravel filter bed takes the place of 1400 acres of reservoir and saves to the company net 6,000,000 gallons of water a day in evaporation, which would occur from water in an open reservoir. It produces a crystal pure water 45 miles from San Francisco. The product is as pure as the water of the Tuolumne which enters a reservoir for storage, 165 miles from San Francisco. This Alameda water when it reaches San Francisco is far better in quality than the Tuolumne water would be when it would be delivered in San Francisco. The Alameda system to-day is but in its infancy and yet is producing nearly one-half of what San Francisco uses. Its value as a water property in our opinion,—looking at San Francisco's water prob-

lem as a continuing one,—is greater than the value of the peninsula properties, because it ultimately is capable of being expanded, gradually as the needs of the city require, by developing the reservoirs in gradual evolutionary stages, as the demand requires, to various heights until it produces 75,000,000 to 90,000,000 gallons daily. (p. 6387.)

Mr. Schussler testified:

“When the consumption of San Francisco has risen to an average of between 40,000,000 and 45,000,000 gallons a day, which may be expected in from six to eight years from now, the proportion of the supply then furnished by the Alameda Creek system will have risen to about one-half, while the other half would be furnished by the peninsula. When the daily consumption has risen to between 60,000,000 and 65,000,000 gallons per day, which may be in about from eighteen to twenty-two years from now, the proportion of the entire supply then furnished by the Alameda Creek system will be about two-thirds, while the peninsula would supply the remaining one-third. When the consumption of San Francisco has eventually risen to between 100,000,000 and 110,000,000 gallons a day, which may be the case in from forty to forty-five years from now, and which the Spring Valley Water Company can easily meet by developing its properties on the Alameda Creek system and increasing the storage capacity of the Crystal Springs reservoir, fully four-fifths of the water then furnished would come from the Alameda Creek system, when fully developed, while the remaining one-fifth would be furnished by the peninsula sources. *Thus, the center of gravity of the Spring Valley Water Company's system, which was originally located on the San Francisco peninsula is gradually shifting eastwardly, which eastward movement will be more and more accentuated as the proportion grows which the Alameda Creek system will furnish.* The reasons, therefore, for comparing the reservoir sites

of the Alameda Creek system with the proposed municipal Sierra Nevada project, are obvious, and particularly so on account of the constantly growing importance of the Alameda Creek system as a factor in the water supply of San Francisco." (Schussler, p. 637-638.)

In theory, this property is to be compensated for when that water is actually being turned into the pipes. Some city engineer 20 years from now is expected to add to the values it then has, an additional amount to make up the elements of value which are now omitted by the present administration. Similarly, other city engineers, 20 years ago, probably valued complainant's Crystal Springs property prior to the time of the building of the lower Crystal Springs dam, at its cost as farming land, on the theory that some subsequent engineer, to-wit, Mr. Grunsky, would add values on it in 1903 and 1904. It is never done.

COMPLAINANT NEVER GETS THE RETURN ON DEFERRED VALUATIONS.

Subsequent generations never pay for the water of the previous generation. Mr. Grunsky's successor, some 20 years hereafter, will not add any value for rates omitted now, any more than Mr. Grunsky added values for the past omitted rates.

In actual practice, Mr. Grunsky does not take care of any of the values lost twenty years ago, does not add interest and taxes on any of them. He only allows the substitutional values at the present time for all of those properties, which 20 years ago were purchased, dedicated to water producing—but not yet in bearing, and hence not included as "being in use."

If Spring Valley had not been loyal to the city by acquiring these properties when they could be acquired at farm-land prices as a basis, either complainant or the city itself would now be strenuously attempting condemnation proceedings of the properties now owned by complainant in the Alameda system to take care of the needs for the next ten years. It would then be a very serious question whether Oakland would not have the better right to the property under the laws of eminent domain. A jury in Alameda county would then be called to fix their values (not at the cost paid by Spring Valley at a time when it purchased them with business foresight), but at their values to-day, as reservoir sites and watersheds producing water, very valuable for a nearby metropolitan city.*

Again, the learned assistant city attorney who tried the case, phrased the theoretical policy of the city in the question asked of Mr. Schuyler on cross-examination: (pp. 5486-7)

"X. Q. 107. You realize, do you not, that the Spring Valley Water Company has what amounts to a perpetual franchise?"

*Mr. Schussler testified as to the importance of the Alameda Creek system:

"The total amount of water drawn from Alameda Creek since the water from that creek has been connected with these Spring Valley Water Works on this side of the bay is far in excess of the total amount of water now stored in all our reservoirs combined, so that if it had not been for the addition of the Alameda Creek water to the system on this side of the bay these reservoirs would have all been empty. There would have been no water here, no water works, and I do not know whether the city would have grown as rapidly as it did if the growing demands had not been met by a growing and increasing supply, which we were only enabled to met by this addition of Alameda Creek. The Alameda Creek system today furnishes nearly one-half of all the water used in this city." (p. 180-1.)

and

"X. Q. 108. What we know as a franchise, or the right to do business is, in the case of the Spring Valley Water Company, made practically perpetual by the constitutional provisions, is it not?"

and again:

"X. Q. 109. Do you not think it would be fair, where the franchise is perpetual and the corporation is certain of being always, under ordinary circumstances, at least, permitted to continue to supply water, that a less income should be allowed than where they had a limited franchise and had to make all their money within a given time?"

That is the *theory*. The *practice* is, that which the city engineer described in a preliminary to his report accompanying the appraisement to the Board of Public Works, which was ultimately adopted by the Board of Supervisors after *eliminating all franchise values* and values as a going concern: (p. 163)

"In reference to the franchise value which you are directed to estimate, what was said last year may be repeated. The *creation or destruction of franchise value lies in the hands of the municipal authorities*, because the earning power necessarily depends upon the rates fixed, and franchise value is directly dependent upon the earnings.

The franchise of the Spring Valley Water Works is not defined by any specific agreement with the city. There is not, therefore, any definite basis available for the determination of its value.

* * * * *

In view of the uncertainty of adequate returns on investments made in water works properties and the special risks and responsibilities assumed by the Spring Valley Water Works in establishing and maintaining its works, an allowance of \$2,500,000 for franchise

value in the appraisal which is to serve as a basis for establishing water rates, appears reasonable."

In other words, as a basis on which to eliminate elements of increased value because of connection with a unified whole from the values placed on tangible properties, the city attorney attempted to have complainant's experts value the property low on the theory that there was little risk in the investment and that water rates were fixed upon the basis that the franchise was perpetual. (p. 5486.) But when the realm of theory was left, and the practical results were obtained, the franchise value was fixed on the theory that Spring Valley Water Works had voluntarily assumed the risk that the Board of Supervisors might be relied upon to create an uncertainty of adequate returns because they had the right to create or destroy franchise value.

The Board of Supervisors then *actually fixed rates on the basis that the franchise had actually been destroyed.*

Again, the learned assistant city attorney voiced the theory of the administration in a question asked Mr. Stearns: (p. 4495)

"X. Q. 1161. Suppose, Mr. Stearns, that the corporation making expenditures of money for water works is practically guaranteed by statute an income upon the actual cost of its works, then there is no risk, is there?
* * * I said practical guarantee. I do not mean that the statute says that the company shall receive an income on the cost of its works. The statute of California provides, at least inferentially, that the Board of Supervisors, in fixing rates, shall allow at least an income on the cost of works actually in use."

Mr. Stearns, although not a lawyer, in his answer to the question very nearly quotes the Supreme Court of Maine when he said:

“A. It seems to omit a great many features,—the reproduction and the question that has been raised about whether works are in use or not. The cost is only one element.” (Stearns, p. 4496.)

Kennebec Water Dist. v. City of Waterville, 54
Atl. Rep. 6, at p. 18, 2nd column.

UNLESS PRACTICE IS CHANGED WATER FAMINE WILL NECESSARILY RESULT.

The vice of this practice of not allowing return on property necessary for development is far reaching. It was practically shown by Mr. Stearns, the Boston engineer. It has practically been shown by all of the other engineers as they have fixed their values. It was practically shown in the theory of the city attorney when he said that there is supposed to be no risk because the corporation is guaranteed an income on its property used and useful, not on certain selected elements of its property, but on *all* its property. The error in principle is, of course, shown more fully by the expression of the courts.

The result of the difference between the theory and the practice of the city administration is, that it makes it impossible for anybody to purchase water property in advance of the city's actual needs.

If only such properties as are actually producing water that is actually put in the pipes delivering water which in turn is actually being taken by the people of

San Francisco for use, is to be paid for, then when the present maximum capacity of those pipes is reached there will be of necessity a water famine, because reservoirs cannot be built except by from two to three years' work; reservoir sites cannot be acquired (without paying abnormally large prices therefor) unless they are bought prior to the time that the owners of the land know that they are to be made available for water and this means from 10 to 50 years in advance.

The money which would now be required to be paid for Alameda properties had not business foresight inspired complainant to make judicious investment in the Alameda Creek properties in 1882, much more than off-set the price then paid and taxes and interest to the present time. And yet, when the city engineer gives them only the value of their primal cost, the learned city attorney wishes the other engineers to give the whole of complainant's properties a value on the theory that the statute guarantees such an income to the corporation, that it sustains no risk.*

*Mr. Stearns practically predicted the present situation when he testified that a threat to bring in the Tuolumne system would precipitate a water famine in San Francisco by the year 1910. He testified: (p. 4483)

"X. Q. 1105. Conceding that the municipality intends to acquire its water from some source of supply, namely, the Tuolumne, or any other, as a matter of fact, and there is nothing in the law of the State of California or of the city and county of San Francisco requiring it to take the works of any corporation at present supplying the water to the city, would not the fact that it is the settled policy of the municipality, as it is expressed in its charter and the acts of its legislative body, to acquire another system of supply, ipso facto decrease the works of the Spring Valley Water Company because it is a threat to shut off their revenue entirely?

"A. I do not think it would, because I do not think that would ever be consummated. I do not think the city of San Francisco would be so unwise. It also seems to me that it would precipitate a water famine in this city.

"Property used and useful" should include so much property as is necessary to insure the water supply to be reasonably equal to the expected growth of the water demand in the near future. Mr. Grunsky, the city engineer, himself voices this in his *theories*. At page 382 he says:

"My opinion is that such properties as are necessary, and as should be owned to safeguard the supply, and as it would be reasonable to assume that the municipality would acquire to safeguard a supply, are necessary in connection with the water works system, and the allowance for such properties in a valuation, apart from the requirement that only properties that are in actual use be valued, would come into consideration either at first cost, with interest added at the time they did come into use, or if the time when they will come into use is a

Footnote, continued.

"X. Q. 1106. How would it precepsitate a water famine to construct the Tuolumne scheme, supposing it is feasible?

"A. By my estimates the consumption of water during the construction of that system, even assuming it could be done in as short a time as indicated by Mr. Grunsky, which I do not think probable, would increase by 10,000,000 gallons per day. The works of the Spring Valley Water Company can supply 35,000,000 gallons per day, or about the present consumption, and, for a short time, could supply more without exhausting the reservoirs, but they would not supply water unless the conditions were very favorable as regards rainfall for the length of time required for the construction of the Tuolumne scheme. I do not see how the company would be warranted or could raise the money to extend its works if a new source of supply were actually under construction, and there would be likely to be a shortage of water as a result.

"X. Q. 1107. In other words, you think that if works were actually commenced upon the Tuolumne scheme the Spring Valley would at once cease to extend its works?

"A. I do not see how it could do otherwise.

"X. Q. 1108. Then it would be true, would it not, that it would cease to extend its works because of the expectation that it would not be able to sell any more water?

"A. Not at all. It would be with the expectation or with the uncertainty as to whether it could sell more water than its existing works could furnish."

definite one and not conjectural, by considering them already in use and as necessary to the work."

And yet, when he admits that the Alameda properties were producing 14,000,000 gallons per day and over (as a matter of fact, up to 16,800,000 and never less than 14,000,000) and the peninsula system was only producing 17,000,000 gallons average, he refuses to consider any element except the cost of the Alameda properties on his theory that they have not been demonstrated to be continuous water producing properties. As the summarization of his cross-examination, he testified: (p. 339)

"X. Q. 71. Then, on the question of actual value, the product is not an element which you would consider as a controlling one?

"A. Not necessarily.

"X. Q. 72. Does not that bring you back, then, in estimating their value, to the question of cost?

"A. It does. I think that cost is the best basis of valuing properties of this kind. Everything else is very speculative."

Thus it will be seen that any element of doubt which has been brought into the valuation of complainant's property, is due entirely to the city administration leaving the principles recognized by their theories and going contrary not only to these principles, but to the law itself.

The city engineer attempts to make up for the abandonment of his theory by adding to the actual values of the structural physical properties themselves, what he deems to be the cost of their reproduction as individual factors, by adding thereto two elements:

franchise \$2,500,000 and value of going concern \$1,400,000. Both of these factors were, however, omitted by the Board of Supervisors in making their allowance of the values on which the rates of 1903, 1904 and 1905 were established. (p. 383.)

Again he says: (p. 350)

"I might state that I do not think it is reasonable to let the valuation of a water works system fluctuate with the fluctuating prices of labor and material. The material that is used in the system has ceased to be a commodity, and it is always very undesirable to have the valuation fixed one year very high, the succeeding year low and perhaps the next year again high.

"X. Q. 136. And your appraisements are not based upon that condition at all?

"A. No."

Again the learned engineer has phrased the principle properly. The materials that constitute the structural parts of the plants have ceased to be materials. They are now portions of an operating plant. Similarly the pumping structures, the watersheds, the reservoirs, the distributing pipes, have ceased being watersheds, reservoirs and distributing pipes. They are now portions of a single entity, viz:—a whole water works plant capable of producing 35,000,000 gallons a day at the present time, with the expenditure of \$11,000,000 or \$12,000,000 capable of producing 90,000,000 gallons, and with the expenditure of an additional \$5,000,000 to \$10,000,000 capable of producing 110,000,000 gallons a day, and are still further capable of expansion by further expenditures to 135,000,000 gallons per day. To attempt to take any part of this unified commodity separately and value it is impossible.

The entire available water product of nearby sources in San Francisco is now owned by Spring Valley.

Had a lawyer immediately after the earthquake of April 18, 1906, owned a set of California Reports that were not capable of being reproduced for several months, he could not have placed a definite fixed value on any part thereof, say, for instance, volumes 102 to 106 of the Reports. And following out this example, if one man, say A, at that time owned volumes 1 to 40, and another man, say B, owned volumes 41 to 80, and another man, say C, owned volumes 81 to 120, and another man, say D, owned volumes 121 to 148, and these were all of the California Reports in San Francisco at the time, and each of these men had offices so far apart that they could not use them together, and a fifth man, say E, had the only copy of the California Digest in existence and he lived in another part of the city, neither one of them would have any means of valuing their property except as a cover, and so many pages of paper, with a small amount added because perchance they might be used separately. Any outside party who would buy all these holdings in California Reports, get them all together and put them all into one plant, would immediately add to them, not five per cent of their former value, nor ten per cent, but more than double their value. They would have a value as a completed whole, as something easily available for use in a market requiring their use and having no substitute.

One could, of course, by paying a large price possibly purchase a set in a nearby town. But as everybody knew that the entire supply was exhausted the seller

could be expected to demand and obtain an unusually high price.

Or he might combine with other prospective purchasers to induce some law book concern to hasten a new edition, the physical printing of which would take several weeks. In either event the lawyer could not have the use of these necessary adjuncts of his business during the time but one set was in the market without the consent of the man who had unified the several component parts. And when he did use them he would find all as a unified whole more useful than had they remained five separate small holdings. After duplicates arrived the set would still have as great value as any other set and more value than any incomplete set.

So here, the complainant has a completed property with values as a franchise that cannot be taken from it. It owns a franchise given to it by the constitution, which franchise is exclusive for the length of time it would take to build a competing system, from 5 to 10 years, and is valuable after the competing system is built, if ever, for its proportion of the water to be supplied. It has the value of a going concern at all times because, without the *illegal* and *improper* intervention of the Board of Supervisors to make it earn less than is a proper amount, this franchise will enable it to produce a reasonable income on its investment.

Now, equity presumes that to be done which ought to be done; this franchise is therefore in contemplation of equity, producing a *proper* rate of interest, we think, the legal rate on the actual value of the properties used and useful.

These intangible elements of value can, of course, be added to the values of properties obtained by first estimating the actual cost, adding appreciation of value, deducting depreciation of structural parts, and then giving it a value as a unified whole, a value for its franchise and a value as a going concern, and then add whatever elements seem proper for skill in engineering, for risk in the original investment, and for extra value on account of insurance due to interchangeability of parts and proximity of sources of supply. Or, these intangible values may be added to each of the structures separately in so far as they affect the particular properties differently from the main structure, and then a value can be added later for the intangible values affecting the whole.

6. WHAT MR. GRUNSKY'S FIGURES WOULD HAVE BEEN HAD HE USED ALL ELE- MENTS OF VALUE RECOGNIZED BY HIM.

Mr. Grunsky, in describing the Spring Valley Water Works, recognized the following elements of excellence:

"They are established works. . . . In their entirety they are comparable with the other projects that are or have been under consideration." (p. 306)

"The works have the advantage of being already constructed and in actual use." (p. 306)

"Their distribution system reaches every important establishment in the city, with over 50,000 private services. . . . There are other portions of their works valuable to safeguard the supply from distant sources. The sources of water utilized by the Spring Valley Water Works are near at home. New sources of supply are being added and still other sources could be brought under contribution if it were essential to do so." (p. 306.)

"The Alameda sources are capable of further expansion, notably by the construction of San Antonio Creek and Calaveras Valley reservoirs. The former would add about 3 to 5 million gallons per day; the latter, 25 to 30 million gallons for delivery across Santa Clara Valley by tunnel and pipe. The Searsville property (Portola) can also be brought into contribution. Its productiveness may reach 7,500,000 gallons per day." (p. 308.)

"In considering the availability of any source of supply it is necessary to give due weight to all its features and to make allowance for those elements which are uncertain. In the matter of undeveloped resources, the Spring Valley Water Works stands on the same basis as the independent projects." (p. 311.)

"The Spring Valley Water Works system, to the extent of its capacity, ranks first in the reliability of its service." (p. 316.)

"In the matter of first cost to the city the advantage (over Tuolumne River project) should be in favor of Spring Valley system." (p. 316.)

In 1901 Mr. Grunsky reported:

"Their business is, however, an established one, and the needs of the city have been fully met in the past, so that the service rendered in the past is ample evidence of the capacity of the works to yield water." (p. 335, Grunsky)

"The service rendered in the subsequent years demonstrated the ability of the filter gallery which has been placed in the gravel bed in Sunol Valley to furnish a considerable amount of water." (p. 336, Grunsky)

Again:

"The quality of workmanship on the works and structures of the Spring Valley Works is commendable throughout. Materials used are selected with care. Special care and extra cost has not been shunned in important cases to secure the best. This is notably the case in the pipe work and in the concrete and masonry structures." (p. 354, Grunsky)

Again:

"Great care has been exercised in making the delivery of water reliable, so that no accident to any portion of the works will inconvenience the city or deprive it of water." (p. 354, Grunsky)

Again:

"As waters go in the United States, I have always considered the water furnished to San Francisco good, but it might, however, be improved." (p. 358.)

Again:

"The value of reservoirs lies in the opportunity to market the water that may be produced there, the bringing it under control, and putting it into pipes and the delivery of it." (p. 364, Grunsky)

"Assuming that the company acts just as the municipality itself would act under such circumstances, the company should look farther than five years into the future, about 20 years." (p. 380, Grunsky)

"A company that is to supply water for an indefinite period looks farther into the future than that." (p. 381, Grunsky)

"If it becomes apparent that some property that will produce water should come into use in the future, the steps towards its acquisition should be taken so long in advance of that acquisition that the property can be acquired without too great an expense. If the necessity is such that the property must be had it is always to be expected that more will have to be paid therefor." (p. 381, Grunsky)

"Fifty years might be a reasonable period for the municipality itself. In the case of a private company it is a difficult question to determine. If I were advising a private company I should certainly look at least 25 years into the future. My opinion is that such properties as are necessary and as should be owned to safeguard the supply, are necessary in connection with the water works system." (p. 382, Grunsky)

"With that qualification, that when they are necessary, the properties are properties from which water will be developed and brought into use in the near future. They are necessary for the proper operation of the system, and in such event they would be valued as a part of the property in use." (p. 387, Grunsky)

"On a one-pipe system from Tuolumne, outside of the city of San Francisco, by the use of the following properties on the Peninsula, to-wit: Pilarcitos, San Andres, Crystal Springs and Lake Merced, \$12,524,000 could be saved." (p. 399, Grunsky)

This would not include the Alameda Creek system. (p. 401.)

"If in combination with the Tuolumne system, the city should acquire the Pilarcitos reservoir, the San Andres reservoir, the Crystal Springs reservoir, Lake Merced and the city distributing system, then the cost to

the city of the Tuolumne scheme would be reduced to \$18,200,000, and there would be saved \$21,300,000 in round numbers, exclusive of interest. If interest at 3 1/2 per cent, amounting to \$2,157,500, were added, it would result in a total saving of \$23,457,000." (p. 402, Grunsky)

"The best available sites for water storage in large quantity—Crystal Springs reservoir and Lake Merced; the latter for emergency use only—are already in use. They should be a part of the municipal system." (p. 407, Grunsky)

"The liability of derangement may be regarded as proportional to the length of the line and to the pressure under which it is operated. The Spring Valley Water Works, with a few days' water supply within the limits of the city in its receiving service reservoirs and with a reserve supply available by pumping at Lake Merced and with three independent pipe lines from as many storage reservoirs 12 to 16 miles from the city, is exceptionally well fortified against interruption of service." (p. 409, Grunsky)

In speaking of storage for the Tuolumne system, Mr. Grunsky testified:

"This location has the disadvantage of being across the bay, and should be still further supplemented by additional storage on the peninsula. There is difficulty in suggesting where this is to be found if the territory now occupied by the Spring Valley Water Works is not to be invaded." (p. 409, Grunsky)

"As early as 1878, long before the rights and lands, whose acquisition had to precede the construction of the concrete dam, could be acquired, the southernmost portion of this reservoir site was converted into a reservoir by the construction of the upper or original Crystal Springs dam." (p. 415, Grunsky)

"It seems to be generally conceded that when rust once attacks a steel pipe its destruction is more rapid than in case of an iron pipe. This is probably due to the difference in texture of the two materials, steel being fairly uniform, while suitable iron is laminated, and the

progress of rusting is checked for a time at each contact surface between laminae." (p. 417, Grunsky)

Referring to complainant's waters, Mr. Grunsky testified:

"Fortunately their actual use for half a century is a strong argument in their favor, and quality, as determined when stored in large reservoirs, and brought long distances under pressure, is a much better guide than any examination of the living stream before its water is given an opportunity of becoming clear and freed from original impurity." (p. 423, Grunsky)

"The constructed work of the Spring Valley Water Works is exceptionally good throughout." (p. 425, Grunsky)*

*That complainant's properties are a unique example of high-class engineering is shown by the following testimony of other experts:

Mr. Hering, the New York engineer, said of them: (pp. 3435-6.)

"I do not know of a water supply for any large city, in view of the difficulties under which the water is secured in San Francisco, which is more economically designed, better built and better managed than this one. Here you have the necessity of a complex system, and the difficulty of managing a complex system is much greater than managing a simple one, as, for instance, merely pumping water from a river. Taking that into consideration, I do not know of a system in the United States which is better managed than this one. . . . In view of the fact that the Spring Valley Water Company owns such a large part of the watersheds from which the water is secured, and prevents their use for any purpose which might contribute pollution to the same, I do not know of another large city where the water is furnished to its inhabitants and is better protected against such pollution than the works of this company; and as for the ground water furnished by the Alameda Creek system in part, that is generally considered the most hygienic water available. And other systems of supply, in some parts of Europe, are being changed for the purpose of getting this ground water on account of its hygienic value."

And again, at pages 3455-6, he said:

"I have been impressed that the quality of the work in general was above the average usually found in such work, built under similar conditions. . . . I found the machinery, so far as I could judge, to be well designed and built with a view towards economical operation, and particularly to reduce the expenses for repairs. There seemed to be neither a display of negligence in designing this

Footnote, continued.

machinery, nor of extravagance. The plants appear to be economical."

On cross-examination he said: (p. 3862.)

"A. to X. Q.2369. The more storage you can get near a large city—of course, within reasonable limits—the better. I think San Francisco is very fortunate in having those large storage reservoirs and having their capacity larger than their immediate watersheds would require."

"A. to X. Q.2372. I do not consider that they are greater than necessary to store all the water that can be produced by the company's water holdings."

"X. Q. 2375. You think that in the future the amount of water that can be produced in the future will produce an excess over the amount that is used by the city, and evaporation, to fill all of the reservoirs when they are all built on all the sites that the corporation now owns?"

"A. I think so." (p. 3863.)

As to the city distributing system, he said: (p. 3452.)

"I saw nothing which led me to see anything which I did not think was proper and would not be efficient, and was not, according to appearances, also economical."

As to the land and water rights and water sources, he testified: (p. 3453.)

"It is desirable, if you can pay for it, to secure as much land of the watershed as possible, and the more such land may be subject to pollution the more land I would have surrounding the reservoirs and collecting the rainfall which is to go into the reservoirs."

Concerning the supply of water, he testified: (p. 3453.)

"I do not think you have any more water than you ought to have. About the land in question, as I say, it is desirable to have as much land as you can afford to get."

As to the gravel beds, he testified: (p. 3453.)

"I examined the filters on several occasions and noticed their construction, and I also saw the water on several occasions. . . . I think that all the work done in order to reach the result was done about as economically as could be done, and without the construction of artificial filter beds for that purpose. . . . They are entirely natural. The water is as clear to the eye as any water that I have seen coming from an artificially constructed filter bed, and, according to analysis, the water is quite healthful and has no materials in it or bacteria, such as we try to keep out, any more than there would be in artificially filtered water. On the whole, I think the results are equally good to those that would have been obtained from artificially constructed beds." (p. 3454.)

Footnote, continued.

He also testified:

That San Francisco is very fortunate in having large storage reservoirs and additional capacity from the near-by watersheds (p. 3862); that all Spring Valley work was up to date, and the pipe better than usual, and that the machinery was better than usual (p. 3911); also that great attention had been given to the interchangeability of the various sources, and this added greatly to the value of the property. (p. 3450.)

As to the efficiency of complainant's property, Mr. Schuyler, the Pacific Coast expert, testified: (p. 5386.)

"There is no one source of supply capable of furnishing a sufficient volume for this city which can compare in any way in proximity with the supply of sources of the Spring Valley Water Company. All sources which might be developed and brought to this city are so very much more distant as to involve an enormously increased expense over the development of the supply of the Spring Valley Water Company.

"Q. 50. You are aware that such conditions in the works of the Spring Valley Water Company have to an extent occasioned the expenditure of somewhat larger sums of money than would otherwise have been necessary had the local conditions for the supply been possible from one source, are you not?

"A. Yes, sir.

"Q. 51. I will ask you in this connection if, in your opinion, there are any extravagant or injudicious or useless expenditures in acquiring these interchangeable sources and in utilizing them on behalf of the company or its predecessor, in the supply of San Francisco with water, which you consider in this connection the results that have been obtained and the local conditions that exist for a water supply in this neighborhood?

"A. In my judgment there have been no extravagant expenditures in the acquisition and development of these various sources of supply by the Spring Valley Water Company, and, in fact, they seem to have displayed so much foresight in looking ahead and forecasting the future needs of the city, and the sources of supply which would have to be ultimately drawn upon for the city, that they have been enabled to obtain their water rights and water properties at a very much less cost than a municipality would probably have expended, because the municipality would not have been able to observe the secrecy and quiet business prudence of the private company in obtaining the separate properties required to be united into the one general supply system. In this way the private company has been enabled to acquire properties at a very much less cost than they would had they waited until they really needed them, or until the owner of the property discovered the use to which it might be put and the probable value which it would have in the future.

Footnote, continued.

"A. to Q. 52. From my general examination of the works, it is my opinion that they are exceedingly well designed, and that while there has been a very admirable class of workmanship in their construction, there has been no such extravagance as would give ground for a just criticism. It appears to me that in every structure which I have examined there is manifest absolute simplicity, and yet a perfect adaptation to the purpose for which it is put. Nothing has been expended in ornamentation, and yet every structure is thoroughly well built and well designed."

* * * * *

"It is a well-known fact, generally admitted, that the pipes of the Spring Valley Water Company, made of laminated iron, have actually lasted longer and been more durable by far than any other riveted pipes in existence made of the ordinary merchantable iron or steel. In view of this fact, and the low cost of maintenance of the system which such extreme durability permits, it becomes really an economy and a justifiable expense to incur the extra cost required to produce such results. I therefore would unqualifiedly say that such extra initial cost is justifiable." (p. 5399.)

As to watersheds, he testified: (p. 5401.)

"I am convinced that ordinary business prudence demands that the storage facilities on these watersheds should be fully as great as those which have been provided; otherwise there would necessarily be a waste of water in certain seasons for lack of sufficient capacity to store the run-off, which waste would be inadmissible and inexcusable where water is so scarce, so necessary and so valuable. . . . I have been over them (the watersheds) pretty generally. . . . In my judgment the watershed lands tributary to every reservoir should be under the absolute control of the company in order to prevent all possible pollution and contamination of the supply, and practically any expenditure must be regarded as reasonable which will attain this result. The health of the community is of first importance. This matter of the reasonableness of the expenditure for watershed lands is particularly true in this case, where the lands have been purchased at an earlier period, before they became as valuable as they are now by reason of the general growth of the country. . . . I do not think the company owns a single acre in its watersheds more than they really need, and I should not consider that their purchase, even at this date, with the present high values which some of the lands have now for residence purposes, would be an extravagant expenditure." (p. 5401-2.)

Also: (p. 5384.)

"In my judgment there is a very considerable advantage in a water supply which is derived from a number of sources rather than from one, just as it would be a measure of safety to have any water supply from any source carried in two pipes rather

Footnote, continued.

than one, so that in case of the breaking of one of the pipes the other would still be in service. Where a water supply is derived from a number of sources, and these various sources are interlaced and interconnected so as to be interchangeable one with the other, there is a very manifest and decided advantage over a supply derived from one source."

As to the use of first-class material in maintaining the plant, the engineer testified: (pp. 5381-2.)

"I think they are perfectly justifiable, and, in fact, the company would be open to very severe criticism if they did not build works so substantially that they would not be liable to frequent interruption of the service. If the works were flimsily constructed, of cheap material and poor workmanship, the loss to the community, as well as to the company itself in the interruption of its water supply, in the uncertainty of its fire protection and in the general inconvenience of being liable to be short of water, would lay the company open to very severe criticism, and would inevitably lead to the encouragement of the construction of competing works which would supply the wants of the city adequately. From every point of view, therefore, the most substantial character of construction is justifiable. . . . When the works are built substantially and with proper degree of care in the selection of the materials and workmanship, they are necessarily designed to meet every emergency which they are called upon to undergo, and must insure the constancy of the service against all ordinary climatic vicissitudes."

Also: (at page 5413.)

"I consider the use of first-class materials and best workmanship always justifiable for any construction, on general principles, but it is particularly so in the construction of a water works plant, because so much depends upon the constancy and reliability of the service in the general prosperity and progress and advancement of the city, and this in turn is dependent upon the quality of the workmanship and the large factor of safety given to all the works by such materials and workmanship as a preventative against breaks and interruption of the service. The cost of maintenance is, furthermore, always very much lessened, and the depreciation of the plant reduced by a high class of workmanship and material."

Also, as to the character of distribution: (p. 5392.)

"Q. 63. Taking the distributing system of San Francisco as maintained by the Spring Valley Water Company, is it not a fact, as you know it, that the original cost is larger proportionately than other cities which are located upon a more general level topographically?

"A. It is a fact; yes.

"Q. 64. Does that same answer apply to the maintenance and operation of the system, as well as its original construction?

Footnote, continued.

"A. Yes, sir; I have no doubt it does, but in a lesser degree, perhaps, except in the course of pumping, which is always less in large centralized plants than in the aggregate of several smaller ones.

"My opinion of the entire system as a whole, as I have examined it and described it in detail, is that it is most admirably adapted to the present and future necessities of a water supply for the city and county of San Francisco; that water of great abundance, sufficient for the needs of the city, can be developed from these various sources and is at hand ready to be developed at any time it may require. It is the supply which is within closest proximity to the city. In quality it is in every way suitable and sufficient. In the matter of economy the works can be constructed for very much less than any substitutional plant can be built in supplying an equal quantity of water. By reason of their proximity they will always have a greater measure of safety and reliability than any plant which might be built from a more distant source. So that in every respect and from every point of view I consider that the present plant and the sources of supply from which the future is to be drawn is adequate in quantity, is satisfactory in quality and has a greater degree of reliability, safety and economy than any other substitute which is possible to be brought to the city." (p. 5434.)

Mr. Stearns, the Boston expert, testified, on direct examination: (p. 4255.)

"Q. 188. Considering the whole works, that is, the Spring Valley Water Company and its sources of supply, its method of conduct of the waters, its entire system of transportation and distribution, what is your opinion of the system as a source of supply for the city and county of San Francisco and its inhabitants?

"A. I have not made a detailed study of the pipe system in the city, so that I can make no answer in regard to that, but in all other respects I have been very much impressed with the excellent engineering displayed in the design and construction of the works, and particularly with the skill displayed in utilizing so large a quantity of ground water from the Alameda district. I regard the system as efficient and economical, and including a wise provision for future use."

And on cross-examination:

"X. Q. 668. Taken as a whole, do you consider that the present plant of the Spring Valley Water Company embodies a system which, from an engineering and economic point of view, is the best that could be designed if it were being constructed as a whole anew to-day?

"A. I should say that, taking the works in general, it was so designed."

Certainly these expressions of Mr. Grunsky, alone, without considering the additional opinion of the other experts would warrant one in considering that the condition precedent referred to in *Metropolitan Trust Company v. Houston*, 90 Fed. Rep., 683-687, had been established to require recognition of an element of value, because of favorable location of plant. In that case the Court said:

“* * * * in estimating the value of this railroad property no allowance was made for the favorable location of the same, in view of the advance in prosperity of the country through which it runs, and the increment to its value due to the settling, seasoning and permanent establishment of the railways, * * * and all of which ought reasonably to be considered in fixing the value of the property and the capitalization upon which at least it is entitled to earn, and should pay, some returns by way of interest or dividends. This is practically the oldest railroad in the State. A few miles of another road were built earlier, but this road, running throughout the whole course of its main line through what is now the most populous and best developed portions of the State, and still rapidly increasing in population and development, has established a business that would not and could not be disregarded in estimating the value of the railroad, if considered solely as a business property and venture.”

See also:

San Diego v. National City, 74 Fed. Rep., 79-83.

Certainly, also, this testimony shows that the foresight and ability displayed by complainant's projectors are entitled to compensation under the principle laid down in *Brunswick v. Maine Water Co.*, *supra*, as follows:

“To be successful, they must be wise and prudent, thrifty and energetic. These virtues, if they have them,

they impress upon the property, making it more valuable than it otherwise would have been. *Is it to be said that they can have no return for skill and good management? We do not think so.*

Mr. Grunsky's testimony also shows that the risks of the original enterprise were very great, and this testimony alone clearly entitles complainant to an element of value under another Maine decision, viz.:

"We think something may be allowed in this respect for the risks of the original enterprise, if there were any. It is common sense that they who invest their money in hazardous enterprises may reasonably be entitled, for a time at least, to larger returns than would be the case if the success of the undertaking were assured from the beginning. The plaintiff concedes that such risks may be considered in valuing the franchise. But inasmuch as the value of the franchise depends chiefly upon the net income which may be produced by its exercise at reasonable rates * * * it follows, we think, that the reasonableness of the rate may be affected by the degree of risk to which the original enterprise was naturally subjected. This does not mean unforeseen or emergent risks, but such as may have been justly contemplated by those who made the original investment. * * * The element of risk, however, is not controlling. It is only one element. It is to be fairly considered in connection with the other elements named. To say just how much allowance should be made, and for how long a period, requires the exercise of a careful, conservative and discriminating judgment."

Kennebec Water Dist. v. City of Waterville, 54 Atl. Rep., 6-14.

Similarly, in *San Diego Water Co. v. City of San Diego*, 118 Cal., 556-570, the Court said:

"Comparison must be made between this business and other kinds of business involving a similar degree of

risk, and all the surrounding circumstances must be considered."

And at page 571:

"In ordinary cases, where the management is fair and economical, it would be unreasonable to fix the rates so low as to prevent the company from paying interest on borrowed money at the lowest market rate obtainable; and, even then, some allowance or margin should be made for any risk to which the company may be exposed, over and above the risk taken by a lender."

Mr. Grunsky's expression of the reliability and constancy of the service also gives a value which has been recognized by the California courts:

"The amount of income it (the water company) is entitled to receive is not to be determined by merely considering the value of the property used in rendering the service, but the value of the service which the public receives is also an element to be determined in considering whether the rates are reasonable."

Redlands etc., Water Co. v. Redlands, 121 Cal., 365-371.

The fact that a substitutional system will lose interest during the time in which it is being substituted and being made similarly efficacious to complainant's property, has been recognized as an element of value in the Maine court, which said:

"In determining the amount to be added to structure value, in consideration of the fact that the system is a going concern, the appraisers should consider, among other things, the present efficiency of the system, the length of time necessary to construct the same, *de novo*, the time and cost needed after construction to develop such new system to the level of the present one in respect to income and business, and the added net incomes and

profits, if any, which by its acquirement as such going concern, *would accrue to a purchaser during the time required for such new construction, and for such development of business and income.*"

Kennebec Water Dist. v. Waterville, 54 Atl., 6-19.

If Mr. Grunsky had given the Peninsula system (to-wit: Pilarcitos, San Andres, Crystal Springs and Lake Merced) the value warranted by the Kennebec case, as shown by his testimony it would have been \$12,524,000. (p. 399.)

It is universally conceded that no other system can be brought into San Francisco economically and effectively without using this Peninsula system.

Complainant's distributing system is found by Mr. Grunsky to be highly efficacious. In attempting to produce a substitute system, he has found a value of \$8,807,000. (p. 280.) While any substitutional system was being installed, there would be a loss of interest on the plant which must be added to the cost of the substitutional system before it could be compared with complainant's system, in accordance with Mr. Grunsky's testimony. He has estimated this interest at $3\frac{1}{2}$ per cent, and found it to be \$2,157,500. (Test. p. 402.)

The Alameda system, which Mr. Grunsky finds can be developed to produce from 28,000,000 to 35,000,000 gallons more than it is at present producing (and at the time the testimony was taken it produced 14,000,000 gallons) is certainly comparable as a water producer with the Peninsula system which Mr. Grunsky finds capable of being increased by 7,500,000 gallons only,

and which was, at the time the testimony was taken, producing 17,000,000 gallons.

As to the relative values of these two systems, Mr. Grunsky differs with the other engineers, as has already been shown in this brief. Mr. Schuyler thinks the two systems equally reliable and equally valuable (p. 5435, Schuyler's testimony); and that but for the Alameda supply the reservoirs would have been exhausted on two separate years (p. 5381); half of the water for San Francisco in 1904 came from Alameda (p. 5434). Mr. Stearns considers them relatively and equally permanent (p. 4256). Mr. Adams testified that he would make no distinction between the permanency of the two systems, nor in their valuation (p. 4708). Mr. Hering considers both equally permanent, but would value the Peninsula system a little higher because of the proximity of the sources and the large storage reservoir capacity provided he overlooked the fact that the water from Alameda Creek was ground water which he considered the most hygienic water available (pp. 3436-3454.)

Realizing that ultimately the Alameda system will produce four-fifths of all water used by San Francisco but nevertheless, taking the element of proximity into question, and *only* allowing the Alameda system 14-17ths of the value of the Peninsula system (being on the basis of 14,000,000 gallons a day average delivery by the Alameda system during the year 1903 and 17,000,000 gallons a day average delivery by the Peninsula system during the same year), and we have 14-17ths or 82 per cent of \$12,540,000.00, or \$10,282,800.00 as

the value of the Alameda system based on Mr. Grunsky's figures, modified by considering the Alameda system as proven in efficiency.

On cross-examination Mr. Grunsky was asked: (pp. 401-2.)

"X. Q. 454. If, in combination with the Tuolumne system the city should acquire the Pilarcitos reservoir, the San Andres reservoir, the Crystal Springs reservoir, Lake Merced and the city distributing system, then the cost to the city of the Tuolumne scheme would be reduced to \$18,200,000?

"A. Yes sir.

"X. Q. 455. How much would that be as a reduction in total expenditure which you estimated the Tuolumne scheme would cost?

"A. About \$21,300,000 in round numbers.

"X. Q. 456. How long would it take to construct the portion of the Tuolumne scheme which would require the expenditure of \$18,200,000?

"A. It is probable that its construction would run through about five years.

"X. Q. 457. What would be the interest during construction on that \$18,200,000, during a period of five years at $3\frac{1}{2}$ per cent?

"A. At $3\frac{1}{2}$ per cent for one-half of the time the interest would be \$1,342,500.

"X. Q. 458. You estimated the interest during construction on the \$39,000,000 basis, at \$2,500,000, did you not, or was it more than that?

"A. It was more than that.

"X. Q. 459. What is the difference between those two amounts of interest during construction?

"A. \$2,157,500.

"X. Q. 460. That would be the interest saved?

"A. It would be the interest saved.

The franchise, which Mr. Grunsky took at \$2,500,000.00, is assessed for 1903-4 by the Assessor of San Francisco at \$5,300,000.00 (Municipal Reports 1904),

and greater the year after. This is practically the mean value given it by Mr. Hering and Mr. Adams under different names. Mr. Hering makes it \$5,000,000.00; Mr. Adams makes it \$5,567,509.00. (p. 4757.)

The value of the going concern Mr. Grunsky gives at \$1,400,000.00.

These all added together are summarized as follows:

RECAPITULATION OF VALUE OF SUBSTITUTIONAL SYSTEM
AS RECOMMENDED BY MR. GRUNSKY AND TAKEN AT
HIS OWN FIGURES WITH THE EXCEPTION OF THE ALA-
MEDA PROPERTIES (WHICH ARE TAKEN AT A PERCENT-
AGE OF MR. GRUNSKY'S FIGURES ON THE PENINSULA
SYSTEM), AND WITH THE EXCEPTION OF FRANCHISE
(WHICH IS TAKEN AT THE ASSESSED VALUE).

Peninsula system (p. 400)	\$12,540,000
City distributing system (p. 280)	8,807,000
Interest saved on the Tuolumne system by use of a portion of the Spring Valley system covered by these figures, as estimated by Mr. Grunsky (p. 402) . . .	2,157,000
Alameda system (estimated on Mr. Grunsky's peninsula figures)	10,282,000
Franchise (Municipal Reports 1904, p. 500)	5,300,000
Value of going concern (p. 182)	1,400,000
Total	*\$40,486,000

*In these figures there is entirely omitted any attempted valuation of the water which all engineers agree must be kept on hand as an element of insurance so as to cover the reliability of service praised by Mr. Grunsky and the necessities for which he recognized. In other words, the reservoirs should be kept filled with 28,000,000,000 gallons in order to prevent a drought, due to the fact that there are numerous successive dry seasons. This amount of water would not, of course, be on hand all the time, because the necessities of the situation would practically draw more or less on the reservoirs at times, and but for the Alameda system they would have been twice completely depleted within the last two decades.

INTANGIBLE FACTOR OMITTED BY MR. GRUNSKY.

We now come to one of the most important, intangible factors omitted by Mr. Grunsky, namely; that due to the skill shown in gathering together the properties in the pioneering days of the development of the metropolis, referred to in the Brunswick decision, *supra*; the risk taken in the original investment, referred to in the Kennebec and San Diego decisions, *supra*; and the peculiar value of the location of the properties themselves, referred to in *Metropolitan v. Houston*, *supra*, and *San Diego v. National City*, *supra*. This includes also, the valuation due to proximity of supply, to interlocking various systems for purposes of insuring continuity, to maintenance of appliances to continue the

Footnote, continued.

At the time the testimony was taken there were 16,000,000,000 gallons on hand. (p. 403.) These 16,000,000,000 gallons are probably a fair average estimate of the amount of water which we have on hand. This water is deliverable in San Francisco and there saleable at prices ranging from 17 cents to 25 cents per thousand gallons, as shown by a table compiled by Mr. Schussler. (page 1536.) A portion of the water is that in Pilarcitos, our 1,000,000,000 gallon reservoir, which is 700 feet elevation above tide and delivers water by gravity into Lake Honda distributing reservoir in San Francisco, which is 365 feet elevation. In other words, this water is absolutely deliverable in San Francisco at a height to give water pressure to two-thirds of the city without it costing complainant anything. Mr. Schuyler considers this water of greater value than any other water to the extent of the capitalization of the cost of pumping water from tide-water sources to the height of is deliverable point. (p. 5623.) We will omit, for the purposes of this discussion, any attempt to distinguish between the values of the waters and take the lowest price of 17 cents per thousand gallons, and the value of the 16,000,000,000 gallons necessarily on hand for purposes of insurance of continuity of water supply for San Francisco, despite the drought we may experience at any time, and we have \$2,720,000. The California courts have held that water is itself a commodity. As Mr. Grunsky has not given any valuation to the element of water on hand at all, we do not include it in the above figures, but call the court's attention to this as a factor to minimize any element of mistake which might be considered to have occurred in any of the foregoing.

furnishing of water in case of accident to one part, and to the fact that all nearby sources capable of being developed into water producing properties have been combined in one project, to enable complainant to be ready and capable of gradually extending the water system for the proper period in advance—somewhere between 25 and 50 years; it also includes the suitability of the structures to perform their services and to resist the ravages of time, such as foresight in using laminated iron in pipes, to be laid under costly pavements, thereby preventing the necessity for repairs. All of these are recognized by Mr. Grunsky to have been covered with commendable skill and courage and by testimony of other engineers quoted in brief.

It becomes, therefore, necessary to fix a basis of valuation, which, according to the Kennebec case, requires the exercise of "careful, conservative and discriminative judgment."

Mr. Stearns is the only expert who has given us this basis of valuation. He allows 10 per cent of the value of the property. Having in mind the fact that vast sums of money were necessarily expended for property, far in advance of the times when they could be used, and the risk that the properties when used would not after development prove to be the water producing properties contemplated, and the loss of interest during the period of preparation, and we feel that this figure, 10 per cent, is conservative. Mr. Stearns said:

"In my opinion, that would be a fair allowance to be made for the special value of the Spring Valley Works, including the fact that it owned a situation which could not be duplicated for anything like the same

cost. I have always had occasion to consider these things from the standpoint of the engineer of a municipality or other public body. . . . I formed the judgment that I would offset the account of the special value of these works and the situation by the depreciation and add 10 per cent to the value of the works as determined in the methods I have stated. I also thought I would be willing to allow that sum if I were the agent of a municipality." (p. 4528.)

Adding 10 per cent to the values already given and we have the following:

FINAL SUMMARY

OF MR. GRUNSKY'S FIGURES BASED ON ALL ELEMENTS SET FORTH IN HIS OWN ESTIMATES.

Value of structural properties, franchise, and going concern	\$40,486,000
Ten per cent element for skill, pioneering risk, proven capacity of the property, superior excellence of inter- lacing system and elements of safety, proximity of supply as a source of minimizing cost of maintenance, and the like	4,048,600
Total	<u>\$44,534,600</u>

That elements of skill, pioneering risk, proven capacity, superior location, excellence of structures and the like are to be recognized in valuations is held in the following cases:

Trustees of Village v. Saratoga Gas Co., 107 N. Y. Supp. 341-353;

Long Branch Com. v. Tintern Manor W. Co., 62 Atl. 474-478;

Kennebec Water Dist. v. Waterville, 54 Atl. 11-16;
Brunswick Water Co. v. Maine Water Co., 59 Atl. 540-543;
Milwaukee Elec. v. Milwaukee, 87 Fed. 577-586;
Ames v. Union Pacific, 64 Fed. 176-179;
San Diego Water v. San Diego, 118 Cal. 568;
City of Danville v. Southern Ry. Co., 8 Int. C. C. Rep. 409-438.

7. VALUES FROM COMPLAINANT'S BOOKS AS ANALYZED BY ACCOUNTANT REYNOLDS.

Mr. Reynolds testified: (p. 4618)

"The investment of the stockholders of the San Francisco Water Works, for the year 1858, was \$185,000, on which interest was calculated to the 31st of December, 1858, from the dates of investment, amounting to \$22,587.50, which, added to the investment, makes a total of \$207,587.50. In 1859 the investment of the stockholders was \$221,825, on which the interest calculation amounts to \$69,012.91, making a total of \$290,837.91. In 1860 the investment of the stockholders was \$25,175, with an interest calculation of \$123,914.61, making a total of \$149,089.61. This fact, of course, must be understood, that the interest on the previous capital is included in that. In 1861 the stockholders invested \$36,575, on which the interest calculation, and the interest on the prior principal, was \$119,698.15, making a total of \$156,273.15. In 1862 the stockholders invested \$84,450 with an interest calculation with the interest on the prior capital, amounted to \$214,595.56, making a total of \$356,220.56. In 1863 the stockholders invested \$84,450 with an interest calculation on that amount, and the prior principal, making \$205,990.79, making a total of \$290,440.79. In 1864

the stockholders invested \$95,631.45, with an interest calculation on that and on the prior principal, making \$273,500.34, which, added to the prior principal makes \$369,131.79. In 1865, to March 1st, the interest on the principal was \$51,814.32. Adding all the totals together I have an investment up to the time of the consolidation—March 1, 1865, of \$1,871,395.63, made up of capital invested, \$790,281.45, and interest on the capital invested, \$1,081,114.18. Against this investment and interest the stockholders were paid seven dividends, amounting to \$69,980, on which an interest calculation was made to the 1st day of March, 1865, on the first six dividends, amounting to \$3,183.43, the last dividend, No. 7, of \$10,000, not carrying any interest, as the calculation was made up to March 1st; adding that principal to the interest calculation it makes a total of \$73,163.43, which, deducted from the principal, with interest added, leaves a net investment as of March 1, 1865, \$1,798,232.20.

“Q. Were all the interest calculations made upon these investments by the stockholders at the same rate as you have specified for each particular year in your testimony?

“A. They were. This is simply a résumé of the prior testimony and statements.

“Q. By years?

“A. Yes sir, by years.

“Q. And was the interest calculated on the dividends of \$59,980 at the same rate that prevailed in regard to capital invested in the year 1864?

“A. Yes sir.

“Q. Now take the Spring Valley Water Works before the consolidation?

“A. The Spring Valley Water Works stockholders invested in the year 1860, \$422,500; an interest calculation from the dates of the investment up to the 31st of December, following amount to \$29,205.74, which, added to the principal, makes \$471,705.74. In 1861 the stockholders invested \$218,500, with an interest calculation on that amount and the prior principal to the 31st day of December, from the date of the investment,

amounting to \$104,802.27, which, added to the principal, makes the amount of \$323,302.27. In 1862, the stockholders of the Spring Valley Water Company invested \$404,375; the interest calculation on that, from the date of the investment to the 31st of December, was \$247,343.82, which, added to the principal, will amount to \$651,718.82. In 1863, the stockholders of the Spring Valley Water Company invested \$140,515, with an interest calculation on those investments, and the prior principal, amounting to \$276,904.57, making a total of \$417,419.57. In 1864, the stockholders of the Spring Valley Water Company invested \$450,945, with an interest calculation on those investments and the prior principal amounting to \$344,946.89, which, added to the principal makes \$795,891.89. Up to the 1st day of March, 1865, the stockholders of the Spring Valley Water Company invested \$100,459.51, on which an interest calculation amounts to \$70,225.61, making a total of \$170,685.12. Adding the totals together you have an investment of \$2,830,723.41, made up of these items: principal investment, \$1,757,294.51 and interest, \$1,073,428.90. The stockholders had been repaid on account of that full-paid stock, \$210,750, on which an interest calculation to the 31st day of May, from the date of its payment, amounts to \$22,876.90. They were also paid dividends amounting to \$18,000, on which an interest calculation from the date of the payment of the dividends to the 31st day of December, was \$726, making for repayments and dividends, with interest, an amount of \$252,352.90; deducting that from the principal you have the net investment, as of March 1, 1865, of the Spring Valley stockholders as \$2,578,370.51.

"Q. What were these repayments?

"A. You remember they bought back from the holders of the full paid stock 435 shares, and subsequently 20 shares, making 455 shares; they paid them in bonds, cash and stock at \$280, assessment paid, \$210,750.

"Q. Were all the interest calculations made for each year at the same rate that you have heretofore testified to?

"A. Yes sir.

"Q. And the same as to the dividends for the years in which they were paid?

"A. Yes sir.

"Q. You have examined pp. 24 and 25 of this exhibit [104] which I propose to offer?

"A. I made it and I examined it.

"Q. And it is correct?

"A. It is correct.

"Q. Now give the details of the Spring Valley Water Works after consolidation and down to December 31, 1904.

"A. The original investment of the stockholders of both corporations amount to \$9,388,246.82, from which deduct (referring to p. 26 of the summary) \$210,750 repaid to them, leaving \$9,177,496.82. The original investments, less this repayment of \$210,750, with interest calculations, amount to \$58,325,597.68 for the investment on 140,000 shares, from which deduct the dividends and the interest on the dividends, amounting to \$23,786,874.70, and you have a balance at credit of stockholders, as of December 31, 1904, of \$34,538,722.98.

"Q. And the bond issue at that time amounted to how much?

"A. \$15,975,000.

"Q. Making a grand total of how much?

"A. \$50,513,722.98." (pp. 4618-22, Reynolds.)

The tabulation of these calculations is set forth in Complainant's Ex. 104.

In order that the Court may have before it at this time the figures for 1905, we also include additional testimony of Mr. Reynolds, as follows:

"To my net investment as of January 1, 1905, which was \$34,538,722.98 I have added interest to June 30, 1905, which amounts to \$949,814.87, which, added to the principal, makes \$35,488,537.85. During the year 1905, up to the 30th day of June, they have paid two dividends, No. 5 and No. 6, amounting to \$352,800, on

which I have calculated interest until June 30, making an interest calculation of \$5,659.50, making a total, of dividends and interest, of \$358,459.50, which I deduct from the principal, leaving, June 30, 1905, \$35,130,078.35 as the net investment of the stockholders.

"Q. What rate did you use in calculating interest on the principal and also on the dividends?

"A. Five and one-half per cent. The bond issue amounts at this date to \$16,975,000, which, added to the stockholders' investment, makes \$52,105,078.35.

"Q. How much of a bond issue has there been this year?

"A. \$1,000,000." (p. 4623, Reynolds.)

Mr. Schussler testified (p. 1586) that the value of property purchased but not then used was in 1903-4 \$4,500,000. As this property was included in the investment shown by Mr. Reynolds' figures, that amount must be deducted to get the value of the property now in use and useful. Hence we have the following

SUMMARY

Gross investment as shown by Mr. Reynolds: deductions from books to Dec.

31, 1904\$50,513,722.89

Value of property not then in use

(Schussler, p. 1586) 4,500,000.00

Net investment in property now in use. . \$46,013,722.89

This amount should be reduced by interest computed on the values of property not now in use from the date of investment to date of disuse—but whatever that result may be, it will still leave the net balance of the investment in the neighborhood of \$45,000,000.

8. VALUES BASED PARTLY ON PRICES WHICH COULD BE OBTAINED FOR PORTIONS OF COMPLAINANT'S PROPERTIES FOR OTHER PURPOSES.

Mr. A. S. Baldwin, a real estate expert of high standing in San Francisco (at p. 5758 of his testimony), in answer to a question to give the total present value of all complainant's real properties in San Francisco in gross, without deduction for cost of grading and putting in condition to be sold, stated that value to be \$16,282,915. The details of the figures which constitute this valuation are shown in complainant's Exhibit No. 128. This includes an estimate of the value of complainant's San Francisco office building, placed at \$900,000 (\$550,000 of which was for land, and \$350,000 for building). This land cost complainant the sum of \$120,000 in November, 1882 (see complainant's Exhibit No. 123). The witness also testified that the increment included in these valuations was probably \$10,000,000 or \$11,000,000 (p. 5765, Baldwin). His valuation of the Lake Merced lands was \$13,650,000 and on the office building, \$900,000; making a total of \$14,550,000, for property admittedly in use. Mr. Grunsky estimated that the Peninsula system, including Lake Merced, would take the place of properties worth \$12,540,000 (p. 400), in case a partial substitutional Sierra system was inaugurated.

As we have already shown in this brief, the Alameda system is worth at least 82 per cent of the Peninsula system, making as the value of the Alameda system on this Sierra substitution theory, \$10,182,800.

Col. Mendell, in his report to the City and County of San Francisco, which is referred to in Mr. Grunsky's report (Municipal Reports, 1876-7, p. 844) said:

"If the city succeeds to the rights of the Spring Valley it comes at once into possession of an income which is available to meet the interest on the purchase money. If the city brings water from another source, it is not only without income for three or four years spent in construction, but enters a field where the Spring Valley will be in competition. The financial bearing of this circumstance is evident."

Therefore it is proper to allow interest during the five years that it would take to instal a substitutional plant as a part of the Spring Valley plant. Mr. Grunsky, on cross-examination, figured out this interest saving at the rate of $3\frac{1}{2}$ per cent, to amount to \$2,157,000 (p. 402). Mr. Grunsky testified that, if a combination were made between the Tuolumne and the Spring Valley system, "the preference would be to unite the Peninsula part of the Spring Valley Water Works system," and that by so doing the city would save \$21,300,000, exclusive of interest, and, with interest, \$23,457,000. This latter figure excludes the Alameda properties, but includes Lake Merced. However, Mr. Grunsky valued the Merced properties at \$2,573,293 (p. 107, Grunsky).

If, therefore, we substitute Mr. Baldwin's valuation for Mr. Grunsky's valuation of Lake Merced properties, we will deduct \$2,573,293 from \$23,457,000, and have as a saving by the use of all of complainant's properties, including the city distributing plant (except Merced and Alameda) the sum of \$20,883,707. Hence the total will become as follows:

Values based on sale price of Merced and Office Building as San Francisco Real Estate.

Value of complainant's properties other than Lake Merced and Alameda properties, based on saving to proposed Sierra scheme (p. 402)	\$20,883,707
Merced and office building, as valued by Mr. Baldwin	14,550,000
Alameda, as based on above figures.....	10,182,800
	<hr/>
	\$45,616,507

It again focuses on \$45,000,000 as the value of complainant's property. This does not include any element for franchise or value of a going concern, but these elements are offset by the fact that the Lake Merced properties have a greater value for metropolitan building purposes due to "unearned increment."

9. TABLE OF ESTIMATES AND GENERAL ANALYSIS.

We have tabulated the figures of the several experts in as comprehensive a manner as can be done under the circumstances. The groupings used by each expert were different in each case; for instance, Mr. Grunsky grouped the city distributing system as including city reservoir sites, and Mr. Schussler grouped the reservoir sites separately and the pipe lines separately. However, similar items are placed opposite each other in the columns. In some instances, therefore, the figures do not follow the same order in this table as are given by the witnesses in their testimony. The table is as follows:



It will be observed that the valuation of \$45,000,000 or one or two per cent less or one or two per cent more has been concurred in by most of the experts who have approached the problem from various standpoints. The eminence of Mr. Hering in his profession (his experience has covered more years than the average man could hope to attain because providence vouchsafed him a long life and he has spent all his mature years in work which has prepared him for just this character of valuations) was such that our government sent him to Europe in order to study European ideas. New York, the largest city in America, and from a public utility standpoint, one of the most advanced cities in the world, has employed him at three different times to reorganize its water works in order to keep pace with its wonderful growth. Philadelphia, itself a tremendously large city, has also employed him several times. Oakland, Sacramento, and other Pacific Coast cities have employed him so that he has become familiar with the California situation. He had the complainant's property under examination at two separate investigations before the time that he testified. Mr. Schuyler is only eminent in a less degree to the extent that he has not had as many years experience and the fact that his experience has been on the Pacific Coast and in the West. Mr. Adams, while having less experience in diversity of problems studied by him, has had a much broader experience and a much more careful training in the problems of San Francisco Bay than any of the other Eastern experts because of his connection with the water problems of the city of Oakland. They all focus on \$45,000,000.

The money actually expended in the acquirement of these properties as testified to by Mr. Reynolds with the proper deductions for properties not now in use, also focuses on \$45,000,000. Now, as if to demonstrate beyond any question that this \$45,000,000 is the proper valuation of this property, we can supply two other evidences.

First, Mr. Schussler, than whom no one stands higher in skill in handling water problems, himself thoroughly impregnated with the value of every detail, stakes his professional reputation on the value of this property at \$51,500,000. He knows of elements of value that nobody else can know of, because of his forty years' study of every detail of possible water production about San Francisco Bay. It has been one continuous labor of love, love of the thorough accomplishment of every enterprise brought to him in his professional capacity. No money could have paid a man for the brain energy used, and the heartaches suffered and nerve force expended to resist the constant bickerings with the public while developing the truly wonderful property that the complainant owns. If he has erred it could only be in the element of safety percentage used; he certainly has not erred to exceed ten per cent, which is the common figure given as the element of doubt to be added to engineering work, and which figure of safety he himself has added throughout to the estimates of structural cost of reproduction. Omitting this ten per cent element of safety Mr. Schussler's figures come to about \$45,000,000.

Conversely, take Mr. Grunsky's figures and add to them the elements which he recognizes as in existence and agrees should be given value in his theory of proper water property valuations, and we again have \$45,000,000.

XI. FINAL CHAPTER: RETURN WARRANTED BY SERVICE.

Finally, the weakness of complainant's political situation is the strength of its legal situation.

The very helplessness of complainant to be a party to the fixing of rates except to appear at an investigation as a witness, must make complainant particularly the subject of protection by a court of equity. Because of the strength of complainant's physical position due to its loyalty to San Francisco in gathering together all nearby water sources so as to be in position to expand gradually with the demand, it is deprived of the element of political strength which it would have if its properties were divided up into a number of petty systems each taking care of a particular district of San Francisco. Each petty company would have its own aggregation of friends who might be able to influence the rate-fixing authorities by educating them up to the necessity of their respective enterprises; but complainant only has for interested friends the very few persons who constitute its officers and stockholders.

Again, none of such petty companies could live if it did not have an immediate annual return to take care of its immediate necessities for growth; hence, each

company would be able to demonstrate to the rate-fixing authorities the necessity for revenue to enable it to expand, because the denial of this revenue would mean immediate inability to continue. Complainant, however, because of its immense capitalization and attendant capacity to meet temporary withdrawals of annual revenue for a few years by omitting dividends entirely, by confining operating expenses to the very lowest figure, and withholding new construction necessary for future deliveries, is not able to demonstrate this necessity until water famine practically stares both complainant and the city in the face.

The converse policy to that followed by the Supervisors, namely an allowance of an income "somewhat greater than what is due to the cost of work sufficient merely to meet the present demands," is recognized as proper in *Long Branch Com. v. Tintern Manor W. Co.*, 62 Atl. Rep. 474-479.

The Chancellor finding complainant thus unable to command protection of its right to revenue for necessary expansion, because of refusal on the part of the legislative body, acting in a judicial capacity, to recognize a sufficient and equitable value in complainant's property, must certainly feel that equity should interpose to prevent a multiplicity of annual suits of a character similar to the one here under investigation. To prevent the necessary annual recurrence of such suits, complainant respectfully prays the Chancellor to indicate in no uncertain terms what equity considers the fair and reasonable value of complainant's properties and to enumerate such elements as are proper to be

considered in connection therewith under all circumstances.

A full determination of the matter must also decide what is a fair and reasonable return to be allowed on complainant's property dedicated for the purpose of supplying water for the municipality and citizens of San Francisco.

Having in mind the fact that all sources of information point to \$45,000,000, we ask that this Court establish that sum as the value of complainant's property in 1903. Having in mind the rates of interest given by the various financiers and brokers, and that California herself fixes the legal rate at seven per cent, we ask that percentage as a fair return to be allowed upon that valuation.

An allowance of eight per cent upon the value of a plant capable of giving hydrant service has been held to be reasonable.

City of Grand Haven v. Grand H. Water Works, 78 N. W. 890.

The proper amount for return to complainant is shown to be as follows:

For income to stockholders.....	\$3,000,000.00
Taxes for 1903 were.....	325,287.66
Operating expenses for 1903 were.....	566,786.97
Depreciation, estimated at one per cent on constructed properties is.....	198,060.00
<hr/>	
Gross revenue in 1903-4 should have been.....	\$4,080,134.63
Gross revenue in 1903 (based on 1902 ordinance) was	\$2,072,379.00
Gross revenue in 1903 on ordinance of that year would have been.....	\$1,943,341.06

The annual expenses of running a municipal plant, if installed in San Francisco, as shown by Mr. Stearns' figures (p. 4230), hereinbefore quoted, would exceed \$4,000,000 by several hundred thousand dollars—this shows as a check that \$4,000,000 would be a fair annual gross return to complainant.

Again, complainant's plant at present performs all the duties of supplying water for fire protection to San Francisco without any return whatsoever, except insofar as it may be included in the \$2.00 hydrant rate of 1903, and \$1.00 hydrant rate of 1904 and 1905.

In *Long Branch Com. v. Tintern Manor Water Works*, 62 Atl. 474-483, the New Jersey court held that an allowance of \$25 per month each for hydrants for similar purposes was proper.

Complainant provides all water used by the city in the twenty-three subsidiary parks. It furnishes the water to sprinkle the 220 $\frac{1}{3}$ miles of paved streets (p. 362, Municipal Reports 1904-05), and to flush the 323 $\frac{2}{3}$ miles of sewers (p. 362, Municipal Reports 1904-05), and to cleanse its cesspools (4666 were cleansed in 1904, p. 386). It furnishes the water for use in and about all the municipal buildings, with their transient, and, in some cases, regular inhabitants;—including its 429 average daily number of inmates of County Jails under the Sheriff (p. 164); its 360 average daily number of inhabitants of the City and County Hospital; its 741 policemen (p. 108); its 576 firemen and 47 additional fire employees, its 373 employees of the corporation yard (p. 221); its practically 2,000 to 3,000 general municipal office employees, its 1,181

school teachers (p. 316); its 117,623 school children (p. 312); its 38 fire houses in which firemen live (p. 213-218); 5 relief engine companies, 10 truck companies, 7 chemical companies, 3 water batteries and its 40,479 cardholders to the free libraries. (p. 298.)

The rates from private citizens comprised in 1905 nearly 5,000 rate-payers, whose total payment for water per house—(and sometimes houses shelter more than one family)—was less than \$1.00 per month, some as low as 22 cents per month, or about three-fourths of one cent for each day. The houses of many of these families are at elevations from 165 to 500 feet above tidewater obtained from reservoirs to which water must be continuously pumped. There were in 1905 about 23,500 rate-payers who paid \$2.00 or less per month.

So far as the payment from the municipality is concerned, the gross amount paid in 1903 was \$135,624.70. (Municipal Reports, 1903-04, p. 403). Of this approximately \$95,000 was for fire hydrants; the remaining \$40,000 for general municipal purposes.

The maintenance of complainant's system, under pressure sufficient for fires, saves to the citizens owning perishable property a large amount on their insurance rates. To maintain this pressure, complainant was compelled to install extra heavy pipes and to eliminate all house connections on its large mains. This caused complainant an additional investment, and also makes subsequent maintenance more costly.

Again, landowners who have not erected any improvements on their property, pay nothing for water,

except by way of an infinitesimal contribution in the general tax. These unimproved lands increase in value because of the city's growth, made possible in part by the good water supply and the certainty that enough water is available anticipating the city's growth for the next fifty years. Such landowners are practically presented with this additional value in part at the expense of the water company.

A proper arrangement of rates so that each parcel of land enjoying water facilities, enjoying the advantages of sewer and cesspool flushing, street sprinkling, and other municipal advantages, could easily increase the general contribution to the water fund so that such increase need not materially increase the amount paid by the individual rate-payer who now pays less than the service warrants.

A large number of citizens now pay nothing for water. The contribution of the transients, the non-householding, the freeholders who have made no improvements, and those who live out of town and do business in town, comes only through the payment by the municipality for water from the general fund. In 1903 the amount thus paid was \$135,000, or 3-100 of one per cent of the value of complainant's plant.

If San Francisco owned complainant's water plant, it would of course not pay itself any taxes. Consequently, the bills paid from the general fund with the \$350,000 to \$375,000, round numbers, which complainant now pays annually for taxes, would be necessarily met from contributions to the general fund from other property.

We submit that a proper arrangement ought to provide that the municipality pay \$750,000 to \$1,000,000 a year as partial compensation to complainant because of the maintenance and dedication of its water properties for use by the city for general water purposes.

Individual water charges to households are paid in 80 per cent of the cases at a fixed sum, without meter. The private consumer takes as much as he likes. The city pays what its Supervisors see fit to fix as proper, without reason or rule.

Compare it with gas. Gas is sold by meter; people know the quantity they are charged for when the bill is presented. If it is too high, the next month they use less. With water it is different—it is never too high and they can waste as much as they like and the Company has no practical means of protecting itself.

The complainant is paying taxes on a franchise assessment of \$5,330,000 and its franchise is considered valueless by the Board of Supervisors when rates are fixed. Such discrepancies as these must show that the Supervisors departed from all rules of judicial investigation when they fixed the water rates.

It must be apparent that not only are the ordinances unfair and confiscatory, but they have not been drawn with proper discrimination, or adjustment of amount to benefit received. The non-householding public has been permitted to enjoy comforts and privileges by way of public use of water, either without any payment or by payment so small as to be far below a rate commensurate to the service.

Complainant's subsequent expansion is to be by construction on its own properties owned in fee simple. In this way it will be enabled to take care of the needs of immediate future gradually without further purchase of watershed. From now on, the increase in population of San Francisco will be far greater proportionately than the increase of cost of producing water,—because as complainant owns water producing properties for many years in advance, the additional capitalization on which returns are based will only include new construction.

Consequently, the individual contribution, to take care of the gross annual charge apportioned to private consumers, will be constantly lessening as the population increases.

These considerations, however, only enter the problem in hand by way of a check. The equitable principle must stand on the figures established by the evidence unless the checks show the service not commensurate with the charge.

Water is a necessity. A rapidly growing city, whose territory is broken up into many hills,—some over 500 feet high,—in a semi-arid country (with no nearby large continuous source such as a large river), requiring three years' reservoir supply to be constantly on hand, has four elements of additional cost for water not suffered by a city on a flat, with a large river nearby: First, cost of pumping and maintaining pipes of additional size and strength capable of withstanding pressure; second, cost of storage and acquiring many small sources as a protection against drought of any portion of the small sources; third, cost of acquiring water pro-

ducing land from 25 to 50 years in advance while the same is far from anticipated municipal growth of other towns; fourth, cost of safeguards to prevent water famine in case of failure of any part of the system through breaking of pipes and cost of interlocking system to permit one source to be transferred to another distributing unit in case its source should fail for any reason.

The fact that successive boards of supervisors have successively refused to allow fair rates based on a proper valuation of complainant's properties for supplying water to the municipality and its citizens has made complainant's gross revenue fall from \$1,500,000 to \$2,000,000 below the proper amount, must inspire equity to appreciate the helplessness of complainant, due to no fault of itself. Fair dealing and good conscience requires that equity should in this case so definitely establish the rules for proper determination of rates that subsequent litigation will be prevented. This will accomplish two equitable purposes; complainant will be insured a fair return for the extra difficult service performed in a hazardous venture and the municipality will be insured a continuous possibility for future growth through the development of properties capable of producing water by this quasi-public corporation. This development can only be made possible by including in the gross return a proper amount on such of its properties as, while useful and necessary to produce water in the immediate future, are not actually producing water for the particular moment. Necessity, as here used, must be considered as that of a rapidly grow-

ing metropolitan city surrounded on three sides by salt water with no large nearby source of supply. Water properties to be economically developed, must be developed in at least ten-year units—these properties are properly defined as being in use during the first three of the ten years of the unit equally as in the last three—although in the first three the water may not yet have been turned into the pipes.

It would seem self-evident that as far as a water supplying company is concerned, there ought not and can not be any hard and fast rule permitting a return *merely* upon property actually used and useful. We cannot but regard such a principle, applied perhaps with fairness to SOME public callings, as absolutely unjust and unreasonable when applied to all public callings. To illustrate: the requirement that reasonable rates should be allowed on property used and useful might with fairness be applied to gas, electric light and power, telegraph, telephone, stockyard, warehouse and grain elevator companies. It might even with fairness be applied to some species of common carriers, such as pack carriers, canal boats, canal and steam boats, draymen, transfer and express companies, stage coaches, and street railways. Thus, a gas company or an electric light and power company, in order to anticipate future demands, need purchase a convenient site of comparatively small area for the erection of works upon which new installations might be erected in due time. But not so with a water company in a semi-arid country. There is no kind of public utility corporation, at least in California, which requires such immense areas free from

human activity as a water company in a semi-arid country near no large stream or other nearby unfailing source of supply. The demand for water, to be properly anticipated, requires that these areas MUST be purchased, from 10 to 50 years in advance of actual present necessity. This is an inherent characteristic of the business itself. Were the purveyor of the water the City itself, it would of necessity be compelled to follow this course, and would be compelled to pay interest upon properties thus acquired for future use. So we say with confidence that a rule of return, based upon the value of property actually used and useful as far, at least, as it applies to water companies in California, dependent upon snow and rain catchment areas and storage facilities, is a rule not founded in reason.

Taking into consideration, therefore, all of complainant's properties, the skillful manner in which the difficult problems of the past have been met, the eminently careful manner in which the perpetual continuity of the supply has been safeguarded to overcome the unparalleled difficulty of the topographical and meteorological situation, the wise foresight in acquiring additional nearby sources ready to be developed and integrated into the already unified whole, without in any way interfering with its continuous supply—we feel that this Court must determine that equity will best prevent future litigation and establish the principles of fair dealing between the parties here by deciding that any ordinance producing for complainant less than seven per cent income on a valuation of \$45,000,000, plus operating expenses, taxes and an annual depreciation

charge, would be unfair and inequitable. Then, as subsequent new construction will be known each year, subsequent rates can be fixed with comparative certainty.

From any standpoint this ordinance is grossly inadequate. It was made by a horizontal reduction of seven per cent upon the rate of 1902, which was itself grossly inadequate and such a cut is in itself a failure to exercise "judicial" reason.

Because the 1902 and 1903 ordinances both reduce the \$5.00 hydrant rate to \$2.50, without re-instating the rate on houses which obtained in 1895 (decreased (because the hydrant rate was doubled) from 50 cents to 22 cents on a one-story house, and from \$2.00 to \$1.08 on a five-story house), it must be apparent to the Court that the unreasonableness of these ordinances is such that it could only have been passed by the legislative body while absolutely blind to the obligations which it assumed when acting in its judicial capacity.

As the 1904 ordinance is the same as the 1903 ordinance except that it provides for \$1.00 per hydrant less and the return from private consumers did not materially increase and complainant added \$680,767.01 to its new construction, it necessarily follows that the decision in the 1904 case (13598) must follow the decision of the 1903 case, and as the 1905 rate is the same as the 1904 rate the decision of the 1905 case (13756) must follow that of the 1904 case.

We respectfully submit that this Honorable Court decree in accordance with the prayer of our bills filed in the cases referred to, in favor of the complainant.

And in as much as issue has been joined thereon we respectfully ask that the Court find upon the following matters:

(a) That it be decreed that the value of complainant's property used and useful in supplying the City of San Francisco and its inhabitants with water, is the sum of \$45,000,000.00;

(b) And that it be decreed that complainant is entitled as a return, seven per cent on the value thereof;

(c) And that it be decreed that the various ordinances establishing rates here complained of, be declared unreasonable, confiscatory, and of no effect;

(d) And that the Court further decree that this complainant is entitled as aforesaid to a water rate which shall produce seven per cent upon the valuation of \$45,000,000.00, and in addition thereto shall produce a sum sufficient to remunerate this complainant for its operating expenses, taxes, and a fund for depreciation;

(e) And that this Court further determine the value of complainant's franchise and its value as a going concern, and the value of its good will, and all other intangible elements of value;

(f) And that this Court further decree that the injunction herein issued be made perpetual, and that such further relief be granted complainant as is in accordance with the prayer of its several bills and in accordance with the usages of equity.

Respectfully submitted,

A. E. SHAW.

HELLER, POWERS & EHRMAN,

Solicitors for Complainant.

*Due service of the within admitted this
day of April, 1908.*

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*Solicitors for Defendants, City Attorney of the
City and County of San Francisco.*